# Montana Outdoors

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*THE COVER:* Meriwether Lewis and William Clark called the whitetail (front cover painting: A. J. McCoy ) the "common deer of our country." Today, this deer has special meaning to the ordinary hunter: It often represents the common man's only chance for a big game hunt. Turn to Ken Walcheck's article on the whitetail on page 15. The ruffed grouse (back cover photo: Jon Cates) is one of five grouse species hunters in Montana seek each autumn. John Weigand's article, "Fires, Rain and Grouse Seasons," leads off this issue on page 2 and explores the rationale behind early grouse season openings.

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# The Director's Column

The threat of resident fish and wildlife management becoming a federal enterprise is more imminent now than ever before. Recent actions (i.e., court injunctions, proposed legislation, lobby efforts and urban influences) of groups interested in preserving and protecting fish and wildlife have forced the federal bureaucracy to seek legal interpretation of its responsibilities, in an effort to establish the perimeters of its authority. Hence, the states' base of authority to manage their renewable resources—fish and wildlife—is being challenged at extremely high levels of decision making—U.S. Attorney General's Office, Supreme Court and Congress.

Up until now, state and federal agencies charged with land and resource management responsibilities have been able to reach agreements, compromises and mutual decisions regarding the practical and philosophical approaches to fish and wildlife management. Legal opinions and congressional mandates could change this by casting the states in a role subordinate to the federal establishment.

The wolf-caribou situation in Alaska prompted the Alaska Dept. of Fish and Game to authorize a wolf hunt to try to curb the depredation of the caribou. A district court ruled in favor of Defenders of Wildlife, halting the hunt on federal land. The Dept. of the Interior sought a U.S. Attorney General's opinion as to whom had jurisdiction over resident wildlife species. The opinion rendered was that the BLM Organic Act gave management authority for resident fish and wildlife residing on federal land to the federal government. Appeals are in progress, but an adverse opinion in the courts would clearly transfer management authority from the individual states to the respective federal agencies.

Another pending action which gives state fish and wildlife agencies grave reason for concern is HR 39—the Alaska National Interest Lands Conservation Act currently being debated by congressional committees. This resolution calls for placing primary management authority for species residing on federal land in Alaska with the federal government. Should the state desire to manage resident fish and wildlife on these lands, it would have to submit a management plan to the Secretary of the Interior. If the plan were approved, authority to manage these renewable resources on federal land could then be delegated by the secretary to the state. Side effects or implications of such federal encroachment could dictate the organizational structure of the state agency, the spending level, the staffing patterns, the level of public involvement, management philosophies, etc.—a precedent state agencies must adamantly resist.

The degree or threat of outside interference in state fish and wildlife management is clearly imposing on our everyday activities. Encroachment of any type threatens our decision making. Montana has no alternative but to assume a leadership role in resistance to federal regulation.

We are vigorously supporting states' rights in all cases called to our attention, in the hope of impacting or defeating the threats of federal encroachment. Should a precedent be set, it appears only a matter of time before the next move and the final curtain—federal regulation of wildlife on federal lands. Each state must blaze a trail of resistance. Our resources are renewable and must remain a part of this state's economy and way of life. We must oppose federal pre-emption of state authority. We cannot tolerate the possibility of fragmented authority. A massive bureaucracy, with national goals, can give little individualized attention to the problems associated with resource management and their place in the overall state objectives.

The Montana Dept. of Fish and Game is joining with other states, the International Assn. of Fish and Wildlife Agencies and the Western Assn. of Fish and Wildlife Agencies to vigorously campaign against federal intervention in state fish and wildlife management. States can be effective, in mass, and Montana must be a leader. Other states are depending on us and believe they cannot accomplish their mission without us. Because of Montana's vast and abundant resource base, we are looked upon as leaders. Therefore, we have an obligation to lend support and leadership in whatever way seems appropriate and beneficial to our survival. ■

# Fires, Rain And Grouse Seasons

## by John Weigand

IN EARLY AUGUST—the driest (and frequently hottest) part of the summer—the Montana Fish and Game Commission sets grouse hunting seasons. Nearly every year, concern about fire danger is expressed. Yet over the past 77 years, the commission closed grouse hunting statewide because of dry conditions only during 1937-39. The commission, the governor and county commissioners have delayed or closed grouse seasons in individual counties for similar reasons. In 1977, the commission opened the prairie grouse season two weeks later than usual in the eastern one-half of Montana because of alleged fire danger.

Questions to be answered again in 1978 will be: What is the fire danger this summer? What will it be when hunting seasons open? Will the influx of hunters increase the incidence of fires on valuable forest, range and crop lands? What hunting regulations should be adopted to satisfy the recreational demands of the public? Why even have grouse seasons that open in early September?

### FIRES

Each September, some 40,000-60,000 hunters set out for Montana's grouse country. Seldom—during any season of the year—is a fire detection and suppression force of this magnitude available. Hunters on national forests are required to have a shovel, ax and bucket. Although no figures document the numbers of hunters who have helped fight wildfires, hunters also help discover such fires and are available to help control them.

Records of wildfires in Montana reflect the very minor role of hunting in causing fires. The Division of Forestry, Montana Dept. of Natural Resources and Conservation, offers fire protection services to private landowners in the state. In recent years, some 22 million acres (23% of Montana and 36% of all private lands in Montana) have been enrolled in this program. *This division recorded 3,898 fires during 1969-77, of which only five (0.1%) were directly attributed to hunters.* Total hunting activities, September-November, *might* have been involved in a *maximum 1.1%* of all wildfires documented during this period.

On public lands, hunters caused 24 (3.5%) of 685 fires on national forests in 1971. In 1975, an estimated 5% of national forest fires were due to hunters; most resulted from unattended campfires. Lewis and Clark National Forest records attribute only 2.9% of all annual fires over a 20-year period to hunters. On range lands administered by the Bureau of Land Management, hunters caused less than 1% of the fires.

### RAIN

While nature seems capricious in distributing precipitation each year, certain norms and patterns exist. They are at least partially revealed from 57 years (1920-76) of records from 10 mountain and 10 prairie weather stations in Montana (Fig. 1). These locales were selected because they record conditions representative of their regions.

Annual records (Fig. 2) show mountainous areas average their greatest seasonal precipitation during April-June (33% of annual total) and the least in July-September (20%). The west season on the prairies occurs May-July (49%) while the dry season is December-February (11%). Annual precipitation peaks occur two to three months prior to grouse hunting seasons. The decline in the mountains "bottoms out" in July and then amounts proceed toward winter's secondary high. Precipitation receipts on the prairies constantly decline between July and December.

Annual precipitation averages vary greatly within the two general geographic systems. Hebgen Dam is the wettest (27.79 inches) and Helena is the driest (11.48 inches) of the mountain stations. On the prairies, Lewistown is the wettest (17.47 inches) and Glasgow is the driest (10.41 inches).

Precipitation receipts were compiled for each five-day period July-September. In the mountains, summer precipitation peaks during late August at five stations; the remaining stations receive peak amounts within the next three weeks (Fig. 3). Rainfall at five prairie stations peaks Aug. 21-25 with seven stations recording highs during Aug. 21-Sept. 10 (Fig. 4). Glendive and Cut Bank also record secondary peaks during this three-week period. These data strongly suggest that mountainous areas will be considerably wetter by Sept. 10 than they are during early August when season dates are chosen. In an average fall, prairie areas are probably as wet as they are going to get by late August-early September.

However, weather averages can be deceiving and extremes seem to be almost as much the rule as the excep-

tion. Therefore, total precipitation during Aug. 21-Sept. 10 was also compiled. These figures indicated that little or no precipitation is received in about three of every 100 years. At the opposite extreme, three or more inches of precipitation are received in about the same frequency. In about 61 of 100 years (a majority), more than one-half inch of precipitation can be expected. Thus, precipitation receipts are sufficient to reduce imminent fire danger in fields and forests in two of every three years.

What about the remaining years? Measurable precipitation is received in one of about every three years, but amounts are less than one-half inch during Aug. 21-Sept. 10. These are years in which irregular precipitation patterns occur. In examining almost 20,000 five-day precipitation amounts, I found that normal late summer-early fall storms moved through some areas "prematurely" or later than in other areas. An early storm may drench an area in mid-August, leaving field conditions quite moist, even without additional rain until early September. Or, late storms may arrive when conditions are much drier than normal—but they do arrive in most years!

## GROUSE HABITS

While bird habits are not an integral part of the fire

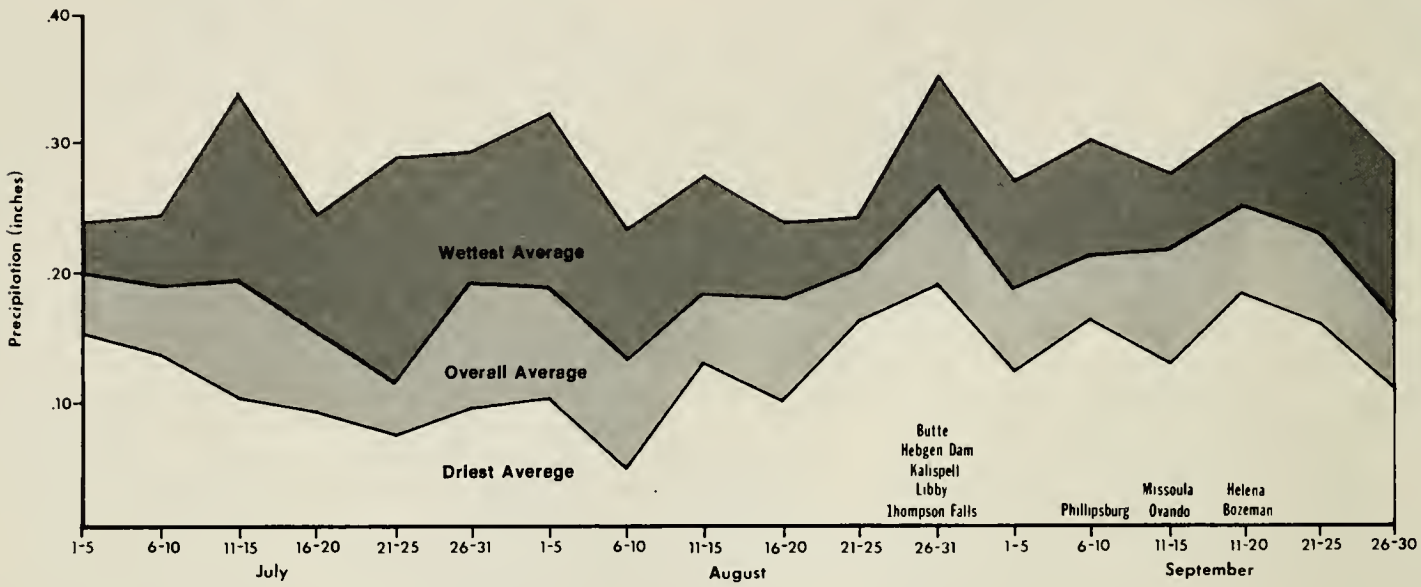
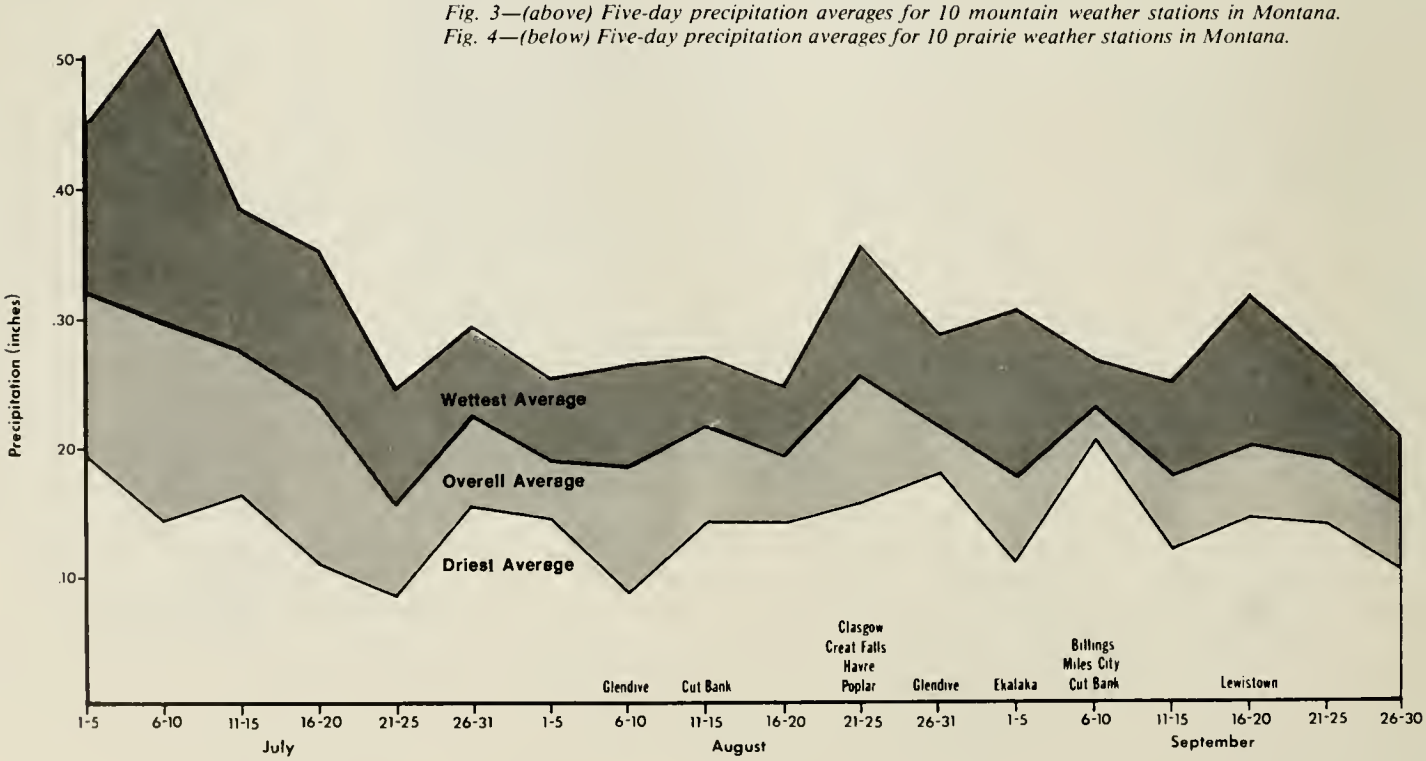



*Fig. 3—(above) Five-day precipitation averages for 10 mountain weather stations in Montana.*
*Fig. 4—(below) Five-day precipitation averages for 10 prairie weather stations in Montana.*



and rain relationships, they form an important part of the recommendations for hunting season dates. Certain behavioral characteristics are recognized in recommendations for early September opening dates.

Individual and social behavior of Montana's five grouse species varies with the approach of autumn. Blue grouse, the most popular mountain grouse for hunters, normally begin leaving lower brood areas by mid-August. Dispersal may be hastened somewhat in dry years or delayed in wet years. They congregate in larger groups high in the mountains by winter. An early September opening is desirable before blues gain the relative sanctuary of high, roadless, mountain elevations. In most areas, an early September season makes more blues available to hunters than a later opening.

Ruffed and Franklin's (spruce) grouse show no such migrational patterns. Their annual movements are restricted to local areas, sometimes to within 40-80 acres. Since ruffs inhabit areas containing deciduous hardwoods, hunters enjoy better success after leaves have dropped for the year.

Difficulty in identifying the species of a flushing mountain grouse, especially in heavy cover, suggests hunting seasons should be the same for all three species. The early September opening increases blue grouse harvests and hunting opportunity for ruffs and Franklins.

Montana's prairie grouse include the sharp-tailed and sage grouse. They are characteristically gregarious, gathering in large flocks prior to winter. Sage grouse broods begin combining in August. Sharptails begin grouping in September. These larger flocks are difficult for hunters to approach on foot since the number of alert or sentry birds increases with flock size.

## HUNTING AND ACCESS PROBLEMS

Previous and current commissions have adopted a policy of not opening upland game bird hunting seasons prior to Labor Day (the first Monday in September). This action minimizes land use conflicts between hunters, other recreationists and landowners.

Mountain and prairie grouse seasons have opened the same day—the first Saturday after Labor Day—during 11 of the past 19 years. Former commissions have shown wisdom in choosing that day. Most of these same-day openings have occurred since 1970 (1977 excepted). Same-day openings on mountain and prairie grouse probably influence hunter distribution minimally in the western one-fourth or eastern one-third of the state. Most hunters probably hunt those species which are available near them—in the west, mountain grouse and in the east, prairie grouse.

Hunters in the middle one-third of Montana (plus the southwest) can hunt either mountain or prairie grouse on opening weekend. Some hunters reside in areas where several mountain and prairie grouse species (plus Hungarian and/or chukar partridge) are available nearby.

About one-third of all resident upland game bird licenses in 1976 were purchased in western Montana. Since much of the grouse habitat there is on public lands, hunting access problems are minimal.

In eastern Montana, much of the grouse country is privately owned. Hunting access could be a problem but

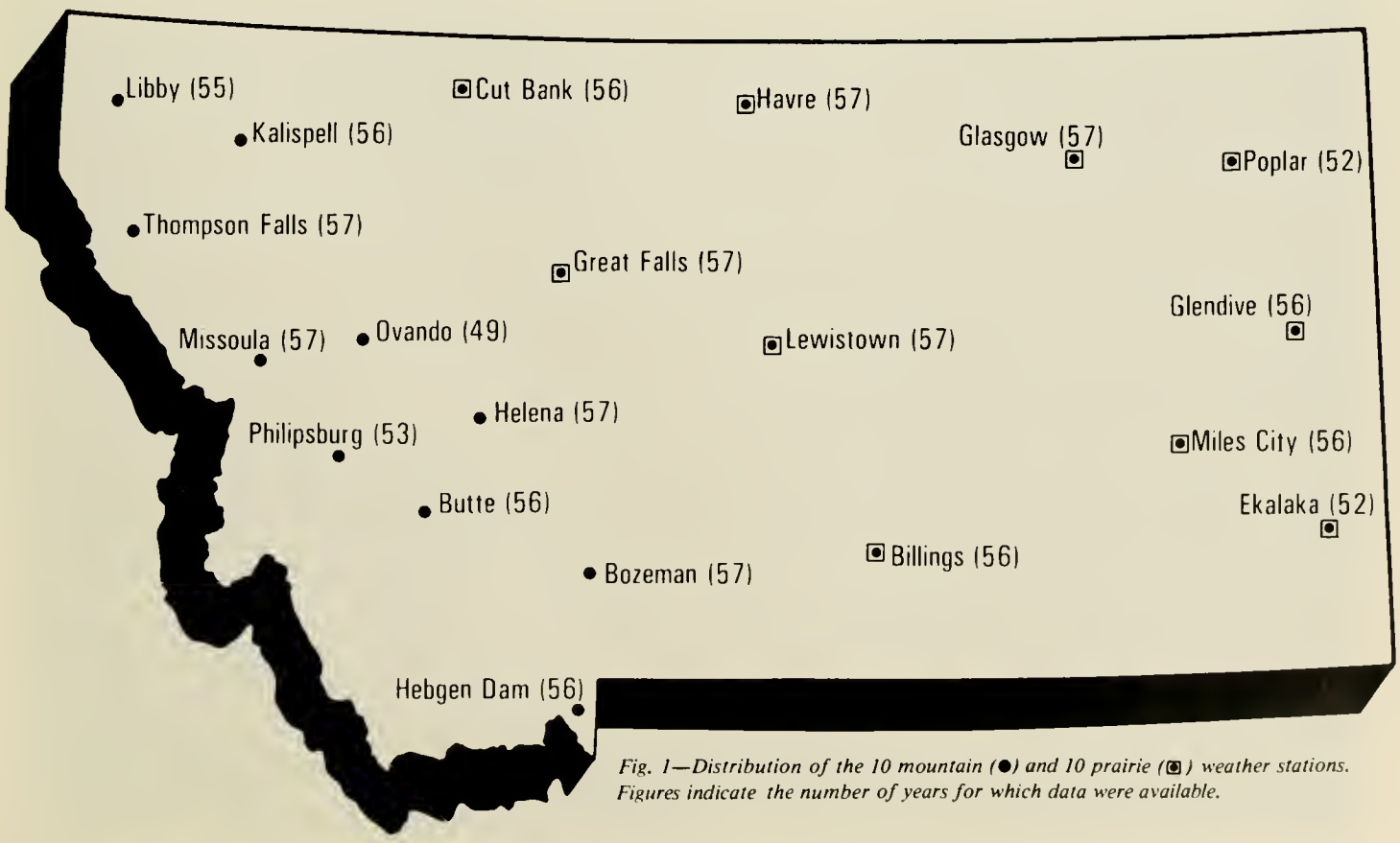



*Fig. 1—Distribution of the 10 mountain (●) and 10 prairie (◙) weather stations. Figures indicate the number of years for which data were available.*

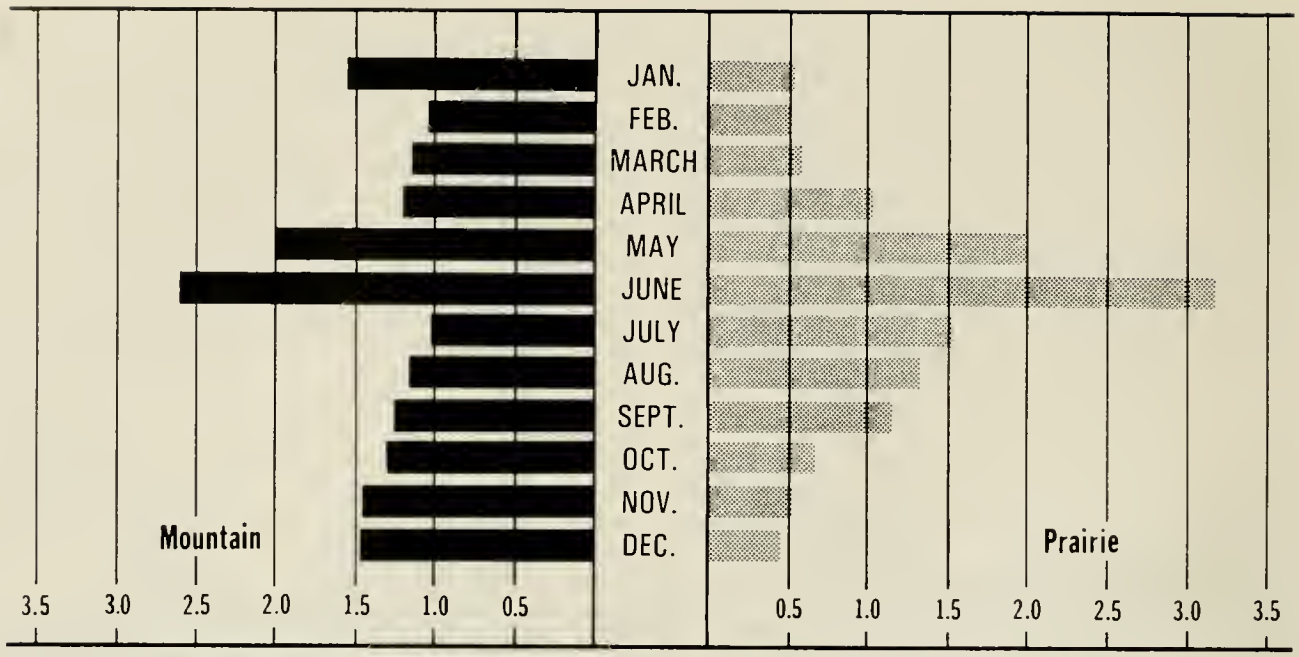



*Fig. 2—Average monthly precipitation (in inches) for 10 mountain and 10 prairie weather stations in Montana.*

overall grouse range is extensive and only one-sixth of the 1976 bird licenses were purchased there.

The remaining one-half of 1976 resident bird licenses were purchased in the middle part of the state where grouse habitats are both publicly and privately owned. Large numbers of hunters from Billings and Great Falls cause some access problems, particularly on nearby popular but private lands.

Two separate or split opening dates, such as those in 1977, could provide more hunting opportunity to some hunters, but they would compound access problems east of the Continental Divide. Hunters in western Montana could enjoy mountain grouse hunting near home and then move to mid- or eastern Montana for the prairie grouse opener. Mid-Montana hunters could also enjoy two opening days but in two different habitat situations. Eastern Montana hunters could move west for early mountain grouse seasons, but information suggests they do not. It seems more likely that their prairie grouse hunting would simply be delayed, the birds would occur in larger groups and be more difficult to approach and some hunters may experience competition from hunters residing elsewhere in the state.

Exactly how many hunters were out on both opening days of grouse hunting in 1977 remains unknown. Increasing hunter access problems on private lands are a reality, however, and one of the department's top priorities is to solve these problems. Split opening dates for grouse hunting seem counterproductive to these objectives.

## A POSSIBLE SOLUTION

Montana's precipitation records indicate wildfire potentials persist in early August when bird seasons are set but are largely neutralized by early September. History shows the fire potentials are usually overexaggerated because seasons are discussed at the driest time of the year.

One approach to resolving annual apprehensions would be commission adoption of a single, standard opening for all grouse seasons, with amendments: (1) allowing earlier hunting seasons in certain areas if the fire danger is not extremely high and (2) delaying opening dates in areas of extreme fire danger. These amendments should be applied judiciously as they could attract hunters into areas with only limited access. The latter amendment should be activated only when documented fire hazards exist.

A single, standard opening should facilitate landowner/recreationist relations by allowing each group to plan ahead for opening weekend. Many landowners have indicated it is undesirable to concentrate large numbers of hunters in certain locales. If hunting pressure can be diffused away from the more congested areas, more land might reopen to hunting. The more land open to hunting, the less hunters would become concentrated. This situation seems to offer much more for landowners than do two or more opening dates for grouse hunting. It should also be welcomed by hunters, since a lessening of competition with other hunters for space and birds enhances the recreational atmosphere.

Hunter distribution will also be affected by other factors. The quality and quantity of habitat is a major factor. If hunting pressure in better coverts exceeds landowner tolerances, hunters can be redistributed by adjusting bag limits and season lengths. Weather conditions, individual hunter economics and gasoline supplies and prices may also influence hunting activities.

However, before we can begin to apply and evaluate various techniques needed to synchronize these interrelated aspects of grouse hunting, we need a beginning point. The single, standard statewide grouse opener can be this point. Based on the information at hand, the recommended opening should be the Saturday following Labor Day. Hopefully, the commission will provide this beginning. ■

# SOUTH SANDSTONE: for once, everybody won

## by Dave Hall

Ray Davis, retired and living in Plevna, may be the most enthusiastic pike fisherman in eastern Montana. During the February 1978 snowstorm which brought much of the southeastern part of the state to a standstill, Ray was ice fishing at South Sandstone. He skied to the reservoir.

Ray fishes with chicken livers. He baits his hook with a piece of liver, then applies something from a small, silver spray can. "It's my secret weapon," he says. "The stuff only lasts 20 minutes. Then I have to spray more on. A lot of people laugh, but nobody leaves South Sandstone with more pike than I do."

In addition to providing some pretty fair pike fishing, this reservoir in Fallon County is insuring a supply of winter hay for a group of ranchers. It also provides a valuable

*The South Sandstone Recreation Area, situated six miles south of Plevna, offers excellent facilities for fishing, hunting, swimming and picnicking. F&G photo: Paul Bushaw*

recreation facility for many residents of southeastern Montana—some of whom travel hundreds of miles to fish, swim or hunt.

South Sandstone has been a breakthrough for local ranchers and recreationists. Despite its small size—about 100 acres—it is the largest body of water between Fort Peck Reservoir, 120 miles northwest, and the Tongue River Reservoir, 140 miles southwest.

Situated six miles south of Plevna, the recreation area is managed by the Dept. of Fish and Game; there are two separate sites within the area. It has received nothing but praise from local residents who recognize the need for water projects which benefit both rancher and recreationist. Keith Seaburg, supervisor for the department's Miles City region, worked closely on the project with sportsmen, ranchers and federal, state and county agencies. "The South Sandstone project," said Seaburg, "is the best of several worlds and it's an excellent example of how a resource can serve more than one party."

Explaining the acclaim South Sandstone has received, Seaburg points out the lack of water-based recreation in eastern Montana. Farm ponds in the area offer some opportunity to fish, but access is often difficult and their size limits number of fishermen and other recreationists. Fishing access sites and recreation areas are not abundant. This is due, in part, to a sparse population and a noticeable lack of lakes and sizable reservoirs.

In 1970, Jack Kanalz, former Miles City area conservationist for the Soil Conservation Service (SCS) and now head of the SCS in Hawaii, approached several concerned ranchers to discuss the feasibility of building a reservoir on South Sandstone Creek to utilize spring run-off for waterspreading. In 1971, eight Plevna ranchers, after discussions with the SCS, formed the South Sandstone Recreation and Waterspreading Group. The group and the SCS began to promote the need for a multi-use reservoir. The Dept. of Fish and Game became involved after recognizing the significant recreational potential. Recalls Seaburg, "From the beginning, we considered South Sandstone an opportunity to contribute something meaningful to this part of the state."

Financial commitments were of immediate concern. The ranchers gave generously from personal funds. Some of the diversion, dike and waterspreading expenses were cost shared with the ranchers through the Great Plains Conservation Program, a federal program administered by the SCS. The SCS also designed the dam and provided technical assistance during construction. Fallon County Commissioners and the Little Beaver Conservation District contributed over $160,000. The Dept. of Fish and Game contributed over $260,000.

Essential for success at South Sandstone, however, was the state cost sharing with the federal government. The Heritage Conservation and Recreation Service (HCRS) (formerly the Bureau of Outdoor Recreation), an agency of the U.S. Dept. of the Interior, provides matching funds for states to acquire and develop recreation areas. The HCRS could not match state funds at its usual 50% rate because the project was not designed exclusively for recreation. After several studies, the HCRS agreed to finance 43% of the project.

The most serious obstacle, however, was initial skepticism. Some people predicted the reservoir would contain too little water during the summer to support fish and was destined to be no more than a mud hole. Some thought benefits for recreationists would be minimal and others felt it would cost too much.

But these objections fell on deaf ears in Fallon County. Among loyal supporters of the reservoir were members of the Fallon County Sportsmen's Club, ranchers and other concerned citizens who felt they were receiving little in return for their tax dollar and license fees. They saw South Sandstone as proof the state was recognizing them.

Democratic Sen. C. R. Thiessen of Lambert spearheaded the drive for legislative approval. He felt his constituency deserved South Sandstone and more projects like it in the future. "There are too many politicians in the state who think of eastern Montana as the Billings area," commented Thiessen. "Believe me, there's a lot of country and a lot of resources between Billings and the Dakotas.

"The legislature turned us down in 1973," continued Thiessen. "After that defeat, we in eastern Montana united. There were just too many people who wanted South Sandstone."

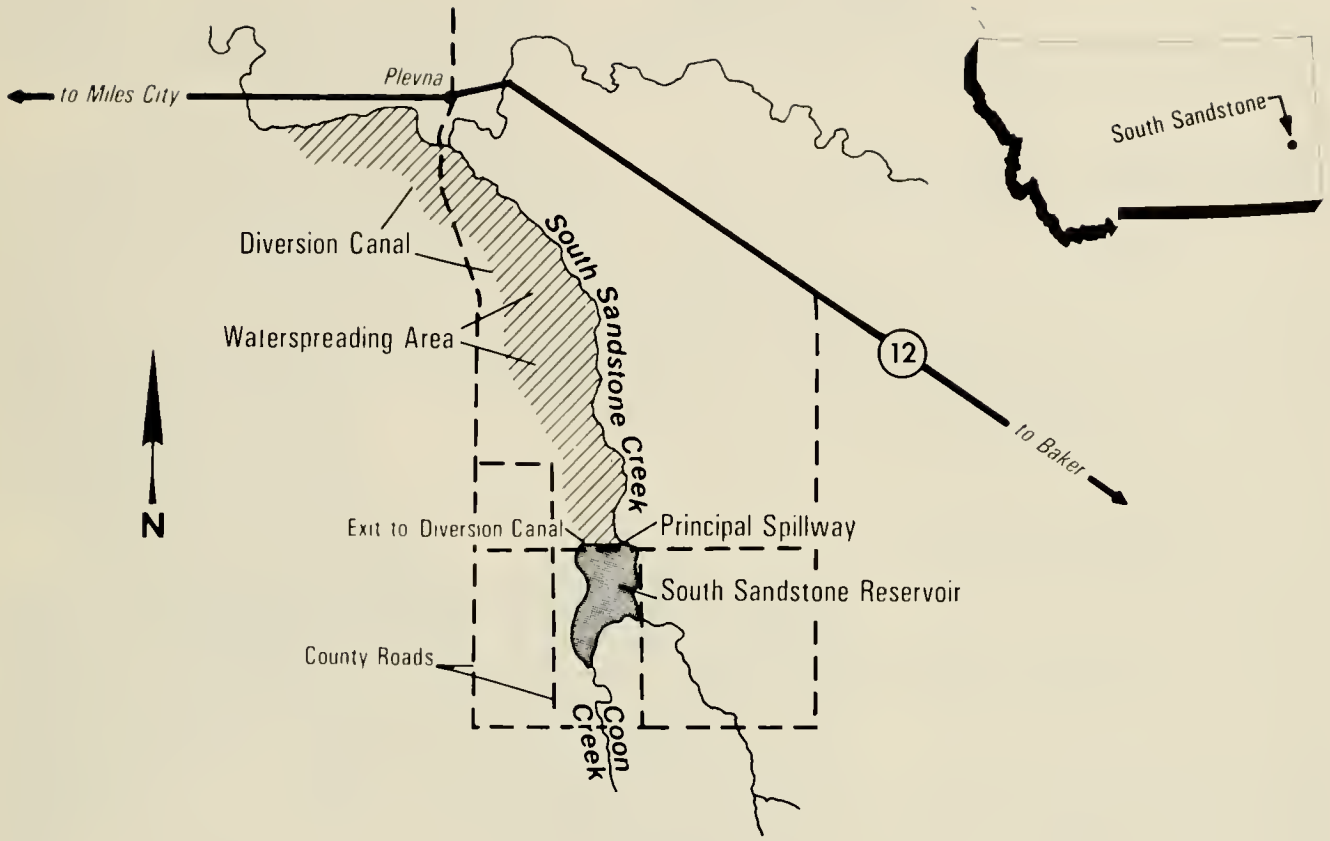
With the support of an increasing number of eastern Montanans—politicians, fish and game officials, ranchers, sportsmen—the 1974 legislature approved the South Sandstone Recreation and Waterspreading Project. Ground was broken in March 1975, and the dam was completed by fall 1976. After the dam was completed, the department established two recreation sites on the reservoir.

But work was far from over. The ranchers offered to reseed disturbed areas. The department provided the seed and ranchers donated equipment and time. Students from Plevna and Baker schools planted willows on the banks to reduce erosion. And department biologists prepared to stock northern pike, walleye and yellow perch.

"Many people did not realize that fish management was a vital consideration during the planning and construction of South Sandstone," said Seaburg. The dam is constructed so it is impossible to use water below a level necessary to sustain fish populations. The department is pleased with the success of the fisheries program and the cooperation between biologists and ranchers.

The department's goal has been a self-sustaining population of northern pike, walleye and yellow perch. During 1976 and 1977, biologists stocked a considerable number of fish: 20 adult northern pike, 35,000 fry and 15,000 fingerlings; six adult walleye and 250,000 fry, and 300 adult yellow perch. Perch provide an excellent food source for the northerns and walleye, as well as fast angling action.

During the first fall, anglers regularly caught 16-inch northerns. Al Elser, the department's fisheries manager




for the Miles City region, said this is not uncommon. "The fish were stocked in a biological vacuum. They had very little competition." Northerns now provide most of the fishing recreation at South Sandstone.

As the ice is leaving, northerns and yellow perch spawn on the thickly vegetated floodplains. An agreement between ranchers and the department guarantees this habitat during April and early May. Waterspreading usually occurs during March when the first spring winds sweep across eastern Montana. During this time, department biologists monitor fish activity and water temperature to predict when spawning will begin. When it does, ranchers have agreed to stop waterspreading. Logs are placed on the reservoir's two exits and the water level is raised by flooding the periphery of the reservoir. Pike and perch then move in to spawn.

The eggs remain attached to the flooded vegetation for about 10 days. After hatching, the fry stay in the shallows for two weeks, gorging themselves on insects. After this insect-eating stage, the fry move into deeper water. The water level is then dropped slowly, so the vegetation will not be killed from extended flooding.

Walleye reproduction has surpassed the hopes of department biologists. The walleye, generally a large lake fish, prefers to spawn on gravel beds near shore. Due to a lack of such habitat at South Sandstone, walleyes were an experimental gamble. But to the surprise of biologists, they have successfully spawned on a heavily riprapped area near the dam.

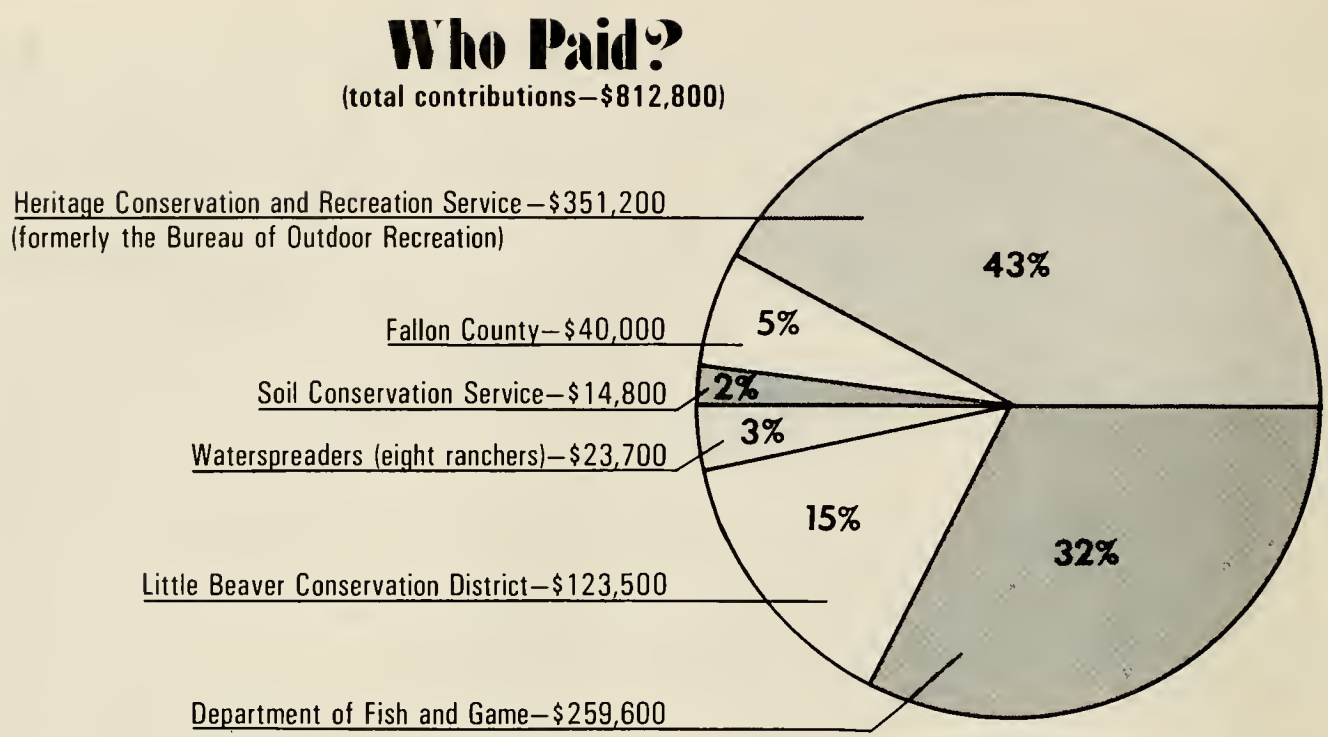
It is not surprising that fishing has been excellent. Although no state record fish have been caught, the success of the fisheries program has made South Sandstone a Mecca for area recreationists. During warmer months, most anglers fish from shore, but small boats are becoming more common. Ice fishing is popular during the winter.

"I can't imagine a better situation," says Elser, referring to the agreement between the department and the ranchers. "They get the water in early spring for waterspreading. We get it when the fish need it."

Although waterspreading is often called irrigation, it has qualities which can benefit wildlife. Ranchers at South Sandstone use run-off from the 48-square-mile watershed in late February and March to flood a complex of fields created by a series of dikes. Each field averages eight acres and receives about a foot of water. As the ground thaws, water is absorbed into the soil and used during the growing season. As pointed out earlier, water is not used during late spring when it is needed in the reservoir for successful fish spawning. Nor is it used during summer when water for wildlife and recreation is scarce.

In this semi-arid country, certain species of wildlife are attracted to reliable sources of water. Waterfowl, shorebirds and upland game are common in and around South Sandstone. Department officials believe three small islands, situated at the southern end of the reservoir, will provide suitable nesting habitat for ducks and geese.

The project offers several benefits to ranchers. Since




waterspreading uses gravity flow, little labor is needed. The dikes are permanent, and repairs infrequent.

Ranchers hope waterspreading will replenish underground water supplies. They depend on this water for many needs and believe waterspreading will store some of the water normally lost during spring run-off.

But, the increased hay yield pays the biggest dividends. Says Plevna rancher Bud Rieger, "With all that water in the soil during the growing season, we got up to three times the normal harvest." Rieger and seven other ranchers have approximately 600 acres under waterspreading. Their annual yield may reach 1,800 tons—three tons per acre.

Fallon County, like many counties in eastern Montana, imports more hay than it exports. Waterspreading has interested many ranchers but, unfortunately, it can be used only on selected sites. Three requirements must be met: (1) a suitable water source, (2) flat terrain and (3) an appropriate soil texture. Soil type is often the limiting factor, according to Louis Jensen, SCS technician in Baker. Waterspreading requires a soil which absorbs large amounts of water and holds it during late spring and summer. Says Jensen, "South Sandstone is perfect in this respect."

Siltation can be a problem. Although sediment settles to some extent in all bodies of water, it can become a problem when much of the watershed is under crop land. High siltation rates will "choke" aquatic vegetation, and recreationists find turbid, muddy water less attractive. The SCS is monitoring the siltation rate at South Sandstone and is finding that the rate, so far, is very low.

Small waterspreading projects are common on the range land of eastern Montana. Waterspreading is similar to terrace irrigation used for centuries throughout the world. It is, however, relatively new to North America. Native Americans may have used some waterspreading. But ranchers did not begin to use waterspreading widely until the disastrous dust bowl years of the 1930s.

South Sandstone is the first large cooperative waterspreading venture in Montana. This close cooperation has impressed many people. "In this day and age it is hard enough to get two people to agree," says John Dalton, area engineer with the SCS in Miles City. "It's amazing when six or seven groups and organizations can work successfully to complete a project."

For whatever purpose the South Sandstone Recreation Area is used—fishing, hunting, swimming, picnicking—excellent facilities are available. A beach has been built. There are sheltered tables and other picnicking facilities. Cold, fresh water bubbles from an artesian well. There is a boat ramp, but motorboats are prohibited until the fragile shoreline is protected by vegetation. In the future, a no-wake rule or limits on horsepower will be established.

South Sandstone is clean, unaffected by the litter which plagues many public recreation areas. This is partially because residents of Plevna and Baker are proud of the area and recognize its value to the community. Says John Ramsey, department warden in Baker, "Folks around here have put out the word that nothing will be done to harm South Sandstone. This makes my job a lot easier."

Word of successful recreation areas travels fast in eastern Montana and Ray Davis might be one of the people you meet there. He just might tell you what he sprays on his chicken livers. And that's worth the trip. ■

# The Catchall

## New MO Editor Named

*Montana Outdoors* has a new editor beginning with this issue. Dave Books, formerly the editor of *Western Wildlands,* a natural resource journal published by the Montana Forest and Conservation Experiment Station, succeeds Bill Schneider, who has joined the director's special staff to study the possibility of producing a children's magazine.

Books holds degrees in forestry and ecology from the University of Minnesota and Yale, and has done graduate work in natural resource policy and journalism at the Universities of Minnesota and Montana. He has worked as an editor for the Forest Service and taught technical writing at the University of Montana School of Forestry.

An avid outdoorsman, Dave is concerned with the threats facing Montana's fish and wildlife resources, and he is committed to preserving the state's outdoor heritage and quality of life.

*Dave Books*

## TU Contributes to Madison Study

The Madison-Gallatin Chapter of Trout Unlimited has contributed $500 toward a U.S. Geological Survey (USGS)-Montana Dept. of Fish and Game cooperative study of Madison River temperatures.

For several years, near-lethal temperatures for trout have occurred in the Madison River below Ennis Lake. This summer, the USGS is conducting a study to predict future temperatures at different flow levels and run-off patterns in the lake-river system. The study is funded under the cooperative agreement with the department.

Determining the severity and location of possible future temperature increases is an essential first step in planning solutions to the problem. The department appreciates the Madison-Gallatin chapter's important contribution to the protection of the fisheries resources of the lower Madison River.—*Art Whitney*

## Cousteau Opposes Sport Fishing

Employing some of the same language used by anti-hunting groups, spokesmen for The Cousteau Society have recently blasted sport fishing.

In a letter to Elwood K. Harry, president of the International Game Fish Assn. (IGFA), Daniel J. Morast, environmental coordinator for The Cousteau Society wrote: "First, your conclusion that Capt. Cousteau and The Cousteau Society are 'dead set against' recreational angling is basically the truth. The reasons for this, however, can be (and often are) misunderstood and misquoted in 'outdoor' type magazines.

"We want people to travel to, experience, understand and enjoy wild natural areas. If people are in such areas, then they must of course eat. If food can be obtained from fishing a local stream or coastal area without damage to the local ecosystem, then fine—fish and eat.

"But this is most often not the case, and we feel one of the major reasons is because of organizations and publications like yours. This is, of course, unfortunate because some hunters and fishermen share a common desire with



recycled paper

hikers and naturalists to improve natural areas and wildlife populations.

"Stated simply, we do not think that the intent of an 'outdoor' experience should be to kill animals. That is why we strongly oppose expensive charter boat operations that fish for 'trophies' like marlin or swordfish. The entire 'trip' is 'look what a great person I am, I've just killed this animal,' 8 x 10 glossies and stuffed trophies included. We do not think that killing a fish is such a great accomplishment!

"We understand that 'trophy fishing' does not necessarily typify the average fisherman, but we assume that the IGFA is not in a position to condemn trophy fishing, or to tell its members, 'killing a fish just to hang on the wall is not a nice thing to do.'

"To address your statement about 'the amount of fish that are caught for human consumption through the sport of recreational angling,' there are some points that need to be clarified.

"First, we are not against the idea of catching fish as a food item. We are, as you indicated, not against commercial fishing. But again, how does this apply to those who buy a boat, motor, fishing tackle, gasoline and bait, for the purpose of bringing home a few bluegill, bass or whatever. The amount of energy (personal and petroleum) and the required dollar investment, renders this a very uneconomical way to put food on the table.

"Secondly, most inland waters —streams, rivers, and lakes—that are fished, are close to urban city areas. People travel, on foot or a short drive, to their favorite fishing spot. There are now so many people who do this, the fish populations have decreased drastically. In order to meet the demand for fish in the lakes, local and state agencies have had to develop restocking operations. What you have is a fish factory which grows fish to a certain size and then releases them only to be caught again by fishermen. This cycle is supported by the fishermen, because the money for the state agencies comes from the fishing licenses.

"We feel the cycle is unnatural, needless and detrimental to the food chain and the balanced ecosystem of the aquatic environment.

"You see, Mr. Harry, Capt. Cousteau wants people to understand and appreciate nature; the needless killing of marlins or a bank full of 'anglers' waiting to belly snag salmon, does not demonstrate understanding or appreciation."

After Morast's letter was published, Jerry Chiappetta, an outdoor writer from Michigan, wrote a short article for Outdoors Unlimited, a newsletter published by the Outdoor Writers of America. In his article, Chiappetta tells of a television interview he had with Capt. Jacques Cousteau where Cousteau stunned viewers by saying, "If one enjoys the act of catching fish—sport fishing—then he is suffering a perversion."

In response, Chiappetta asked Capt. Cousteau if he meant that 60 million hunters and anglers who enjoy the sport of taking fish and game are perverts. Cousteau flatly answered, "Yes."

At least he made himself perfectly clear.—*Bill Schneider*

A passing motorist spotted these two deer fighting in a ditch and notified Donald LaBaugh of Choteau. By the time LaBaugh arrived with his camera, the deer had gone through a barbed wire fence and ended up in the river. Dept. Warden Sgt. Jack LaValley was called in, and with the help of Ben Hoge and Frank Plachetka, roped the deer and freed them.

## Employee Receives Society Award

Bob Greene, Dept. of Fish and Game wildlife biologist and manager of the Warm Springs State Game Farm, is the 1978 recipient of the annual achievement award of the Montana Chapter of The Wildlife Society. The award is presented for outstanding service to the profession of wildlife management.

The chapter's award is often presented for a single achievement. Less frequently, as in this case, the award is given to an individual for long-term, faithful performance in the field.

Greene has been with the department's game farm at Warm Springs since 1951. A graduate of the University of Montana in Missoula, he did extensive work with upland game birds, including statewide surveys, until his assignment to the game farm. He was instrumental in establishing the statewide turkey transplant program and in handling negotiations for the Warm Springs Wildlife Management Area.

A recent recipient of a Dept. of Fish and Game 30-year service pin, Greene and his wife, Kay, have two daughters, Mary Lynn and Jo Ann.—*Ann Miller*

## Tune Up for the Fall Hunt

Over the past several years, I have spent many fall days working at game checking stations. It has become increasingly evident that a growing number of hunters are going into the field without any idea of whether or not their rifles are shooting straight.

After the hunting season is over, too many hunting rifles are cased up, put into the closet and traded for skis, bowling balls or some other piece of recreational equipment. Unfortunately, a great number of these firearms will not see the light of day until the following hunting season. By that time, it's too late for a hunter to properly prepare himself and his firearm for adequate use in the field.

The hunter who has not taken the time to sight in his rifle may take a couple of different attitudes toward the predicament into which he has gotten himself: (1) He may just say to himself, "Well, 'Ol' Betsy' just can't be off from last year. I'll just take a chance on her like

she is." (2) He may hurriedly look for a makeshift target about 100 yards away, shoot a couple of times and call it good.

Going hunting with a rifle that a hunter has not practiced with is just like a baseball player going into a game without taking batting or catching practice. When the big opportunity comes, the baseball player may strike out or make an error and the hunter may miss a shot or wound an animal.

A preseason tune-up for a hunter and his rifle offers more advantages than just knowing where the gun is shooting. The hunter who has spent a considerable amount of time with his firearm before the hunting season will be a safer hunter in the field. Familiarity with equipment comes only with use and this happens only when proper time is given to practice.

There will be less chance of wounding game if a hunter knows exactly where his bullet will be hitting at 100, 200 and 300 yards. Proper bullet placement can only be accomplished by a hunter who has taken the time to practice.

Mechanical problems within a gun or scope will often be discovered while tuning up and can be corrected before hunting season begins.

A prehunt tune-up is also a lot of fun and becomes more challenging each time. At first, a shooter may be satisfied by hitting a target with three shots spread out over a foot of paper. Before long, however, and with practice, this same shooter may have the enjoyment of placing three shots in the bull's eye.

July and August tend to be slow, lazy months. Thoughts shift from favorite fishing holes to golf scores and vacations. This is also a good time to start thinking of the upcoming hunting season. Contact your favorite hunting partner and head for the nearest rifle range.

A preseason tune-up with "ol' Betsy" and some good companionship at the range with fellow shooters can be very satisfying and can pay dividends during the fall hunting season.—*Fred J. King*

# Projects Selected

The Parks Division of the Dept. of Fish and Game has announced selection of Land and Water Conservation Fund (LWCF) grant recipients for fiscal 1978 (July 1, 1978-June 30, 1979).

The LWCF, administered at the state level by the Parks Division, is a grant program that can provide funds for up to 50% of the cost of outdoor recreation projects. Grants are awarded to assist with acquisition and development of public outdoor recreation areas and facilities. The Parks Division receives and apportions LWCF dollars to political subdivisions of the state (such as counties, towns, cities, etc.) annually.

Montana was apportioned $2,665,458 from the LWCF for fiscal 1978. Funds not obligated to the locally sponsored projects listed below have been obligated to projects sponsored by the state of Montana. At the state level, approximately $850,000 will be spent on construction at state parks, recreation areas and fishing access sites, while an additional $750,000 will be expended on acquisition of state parks, recreation areas and fishing access sites.

The Parks Division received applications totaling nearly $3 million in fiscal 1978; just over $1 million of these requests will be funded. Applications received were ranked using a selection procedure based on guidelines established by Congress and the Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation). Generally, projects providing the greatest amount of recreation opportunity to the largest number of people received the highest ranking.

If in fiscal 1979 Montana receives the maximum number of dollars anticipated, the state will recieve $3.7 million. Undoubtedly, competition for these dollars will again be keen. Anyone interested in applying for LWCF financial assistance should contact the Parks Division in Helena.

Applications are accepted annually through Nov. 1.

Projects funded in 1978 include:

| Sponsor | Project | LWCF Dollars |
|---|---|---|
| Billings | park development (Edgerton Addition) | $ 20,000 |
| Blaine County | park improvements (Turner, Mont.) | 1,500 |
| Boulder | park improvements | 8,750 |
| Butte | park development (Whittier Park) | 90,000 |
| Custer County | park acquisition and development (Signal Butte) | 370,000 |
| Deer Lodge | swimming pool | 233,000 |
| Dutton | park improvement (city park) | 7,500 |
| Fallon County | Baker Lake dredging and improvement | 45,000 |
| Flathead County | land acquisition (near Foy Lake) | 20,000 |
| Gallatin County | youth camp (Hyalite Lake) | 70,000 |
| Gallatin Gateway | park improvements | 16,100 |
| Great Falls | park improvements | 70,000 |
| Harlem | reservoir development | 6,000 |
| Hill County | rifle and pistol range (Rookery Recreation Area) | 18,600 |
| Missoula County | community park development (Ft. Msla.) | 50,000 |
| Ryegate | multipurpose court | 3,000 |
| Simms | jogging track | 4,800 |
| Troy | city park improvement | 4,450 |
| Whitehall | park development (old high school site) | 20,000 |

## BOR Receives New Name

A new agency, the Heritage Conservation and Recreation Service, has replaced the Bureau of Outdoor Recreation (BOR). The new agency has assumed duties assigned to BOR, as well as added responsibilities. Its activities will focus on natural and cultural heritage and recreation resources.

Functions of the new department will include administration of the Land and Water Conservation Fund, the Historic Preservation Program (formerly handled by the National Park Service) and implementation of a new National Heritage Program. The new agency will be administered under the U.S. Dept. of the Interior.

## NRA Names Montana Rep

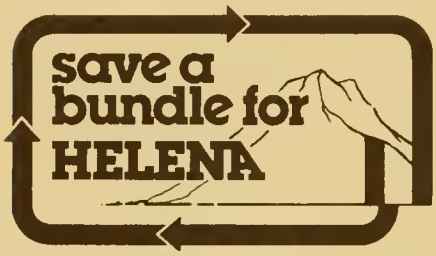
The National Rifle Assn. (NRA) recently appointed a field representative for Montana—Roger Koopman of Bozeman. Koopman has been on the job since December.

A graduate of the University of Idaho, he comes to the field staff from NRA's Institute for Legislative Action. Koopman and his 14 counterparts across the nation work with NRA members and affiliated clubs and present various aspects of NRA activity to the public.

He lists promotion of hunter safety training, improved landowner/recreationist relations, club formation and range construction as his chief priorities. He is also involved with the issues of

gun control and anti-hunting. He said, "My goal is to attempt to educate and alert the public to the constant danger of restrictive legislation."

Koopman is available to speak before interested groups. Write him at P. O. Box 1966; Bozeman, MT 59715.




On April 3, 1978, Helena sanitation workers began an additional service as they ran their regular garbage collection routes: picking up bundles of newspaper for recycling. The 20 tons of newsprint collected by the end of the first week filled a semi-truck trailer and brought almost $1,000 into the city of Helena coffers.

Newspaper recycling became a reality because local citizens, alerted to the potential for newspaper recycling by Adela Awner of the National Wildlife Federation, researched the possibility for such a program. This volunteer group, the Solid Waste Task Force, presented a proposal to the Helena Citizens' Council and the City Commission indicating that the 900 tons of newspaper discarded each year in Helena could be recycled at an economic and environmental profit. These recommendations were approved and funds were allocated for the project's initiation. Loren Gunderson, a consultant from the Montana League of Cities and Towns, was loaned to the city as program coordinator.

Revenue from the recycling program will pay for implementation costs within six weeks. Further revenue generated from the program will benefit Helena citizens by offsetting costs of garbage collection.

Newspapers which were taking up precious landfill space are now being converted into cellulose insulation at a Great Falls plant. Insulation, which can be manufactured from virgin cellulose products or newspapers, is in short supply because of rising energy costs. Therefore, newspaper recycling makes efficient use of a consumer waste to conserve natural resources and energy.

For more information about Helena's newspaper recycling program, contact the City Sanitation Service at 442-9920, ext. 58.

# Contributors

What is the fire danger this summer? What will it be when hunting seasons open? Will the influx of hunters increase the incidence of fires on valuable forest, range and crop lands? What grouse hunting regulations should be adopted to satisfy the public's recreational demands? In his article, **John Weigand** answers these and other questions about "Fires, Rain and Grouse Seasons." Weigand is the fisheries and wildlife biologist supervisor for the department's Research Bureau in Bozeman. He holds a B.S. in biology from Wisconsin State College, Stevens Point; an M.S. in wildlife management from Michigan State University in East Lansing, and a Ph.D. in fish and wildlife management from Montana State University, Bozeman. He is the president-elect of the Montana Chapter of The Wildlife Society. Weigand's article leads off the July/August issue, beginning on page 2.

South Sandstone is more than a recently created reservoir in eastern Montana. As **Dave Hall** points out, recreationists received an area in which to fish, swim, hunt, picnic or just relax. Ranchers received a supply of water which has greatly increased hay yields. The South Sandstone Recreation and Waterspreading Project provides an excellent example of how a resource can serve more than one party—especially in a part of eastern Montana where fishing access sites and recreation areas are not abundant. Turn to "South Sandstone: For Once, Everybody Won" on page 7. Hall has recently joined the Utah Division of Wildlife Resources as the editor of *Utah Wildlife*. He earned a B.S. in zoology from the University of New Hampshire, Durham, and an M.S. in wildlife ecology from Yale University, New Haven, Conn.

Meriwether Lewis and William Clark called the whitetail the "common deer of our country." Common it may be, but it would be difficult to find a sportsman who doesn't have admiration and respect for it. As **Ken Walcheck** says in his article beginning on page 15, "Its biology is intriguing and it represents one of the most adaptable, widely distributed and highly regarded of our big game species." On page 30 of this issue, Walcheck explores another aspect of the deer situation—"Epizootics: Mystery Deer Diseases." Interest in these diseases—which spread quickly among mammals—was heightened when mysterious die-offs of deer were reported in 34 areas of eastern Montana in 1976. Walcheck reports some of the fact and fiction surrounding these outbreaks. The department's information officer in Miles City, Walcheck was formerly an assistant professor of biology at Northern Montana College, Havre. He holds a B.S. in wildlife conservation and biology from Wisconsin State University and an M.S. in ecology (applied science) from MSU.

Flanked by the majestic Mission Mountains on the west and by the Swan Range on the east, the Clearwater River Valley is one of Montana's most scenic areas. Two of the southernmost bodies of water in the Clearwater "chain of lakes" are "Salmon and Placid Lakes: Montana's Newest Parks." Donated by Champion International, 42 acres on Salmon and 32 acres on Placid are now available to recreationists. Valued at more than a half million dollars, the areas will be managed within the state parks system. Turn to page 27 for **Ron Holliday**'s article. Holliday is the administrator of the department's Parks Division. He earned a B.S. in recreation from Rice University, Houston, and an M.S. in park administration from Colorado State University, Fort Collins.

Of all the relationships between the various animals, one of the most intriguing is surely the dependence of burrowing owls on burrowing mammals. The only owl in the Western Hemisphere which is almost totally ground dwelling, the burrowing owl inhabits the burrows of prairie dogs, ground squirrels, foxes or badgers. Although these little owls usually utilize vacant burrows, they are not above taking over occupied burrows and driving the tenants away by repeated "dive bombings." **Frank Gjersing**'s article, "Feathers Underground—The Burrowing Owl," begins on page 36. Gjersing is a game biologist for the department, working in Havre. He holds B.S. and M.S. degrees, both in fish and wildlife management from MSU.

Special thanks to **Kelly Vollrath** for the white-tailed deer and antelope pen and ink illustrations which accompany the article on epizootics, and to **Takehiro Taira** for his pen and ink illustration of the burrowing owl. Vollrath is a wildlife illustrator who lives in Great Falls; Takehiro operates Leisure Art Studio in Kalispell.

Illustration: A. J. McCoy

# Whitetail:

## The "Common Deer of our Country"

### by Ken Walcheck

A RAW NOVEMBER WIND whistles across the eastern Montana landscape, jostling ragged patches of ominous clouds and rattling remnant clusters of leaves clinging to rain-soaked cottonwoods.

Away from the wind on a large island studded with cottonwood and willow, four deer are bedded down. Last night they swam the Yellowstone, fed in a corn patch across from the island and then returned before dawn to rest during the daylight hours. They are relaxed, with good reason. Thousands of years of improving their survival skills have caused them to select their bedding grounds with care. Wind-strewn air molecules carry the scent of any danger and their beds are strategically placed to cover all approaches. The shadowed security of the surrounding cover further enhances their ability to sort out any danger that might confront them.

Suddenly, a twig snaps, the sound muffled by a mantle of soggy leaves. Instantly, all noses are up, ears out, testing the air for scent or sound of danger. Distant footsteps, barely audible, mark the location of a hunter slowly threading his way through the brush. The deer suddenly stand, rigid and tense, ready for instant flight. At first glimpse of the intruder, the deer, flags up and with buoyant grace, bound around a bend in the island

and out of sight. The hunter never knew they were there until he crossed the spot where the deer had scuffed up the leaves in hasty departure.

Any warm-blooded land animal that goes places in a hurry—especially when being chased—has to know where it is going and must direct its movements with considerably more briskness and precision than does a sluggish reptile. Otherwise, disaster is inevitable. As their speed increased, deer and other land-roving vertebrates had to evolve more refined nervous systems to cope with increasingly complex problems. After eons of careful evolution in this speciality—how to endure as a prey animal—the white-tailed deer has perfected its means of escape and survival.

It would be difficult to find a sportsman who doesn't have admiration and respect for the white-tailed deer. Its biology is intriguing and it represents one of the most adaptable, widely distributed and highly regarded of our big game species.

For the sportsman, the whitetail is a big game species inextricably webbed with traditional and pungent reminders of boyhood dreams—all fused with a spiritual aura that defies interpretation. As one whitetail hunter said, "Deer carry wilderness entangled in their antlers; their hoof prints put the stamp of wilderness on tame country."

Today, this deer has special meaning to the ordinary hunter. The whitetail often represents the common man's only chance for a big game hunt.

For everything we can confidently state about deer, many gaping holes still exist in our knowledge of this species. If Mother Nature had recorded Earth's history since life first appeared and if she had written only one page every 10,000 years, her treatise today would include over 300 volumes, each with 1,000 pages. Somewhere near page 900 in the most recent volume, she would have recorded man's appearance. Only on the very last page would she have noted man's ability to record his own history. Small wonder, then, that we still have much to learn about deer.

The whitetail is a member of one of the oldest living families of mammals on the North American continent. Paleontologists (specialists studying life in past geological periods) believe deer developed during the middle Miocene Epoch 15-20 million years ago. During the intervening time, deer have been subjected to nature's experimentation in a constantly changing environment and exposed to major ecological, geological and climatic disturbances. These tests have finely honed their ability to adjust to transitory and unstable conditions.

Deer saw the rise and decline of the saber-toothed tiger, the mastodon, pioneer homesteaders and frontier miners. Without much doubt, deer will be around for many millennia, representing a valuable aesthetic, recreational and economic asset.

There's all that, and something more.

Whitetails possess a blend of uniqueness and flexibility that allows them to adjust and adapt to a wide range of environmental conditions. They have survived in

*"Winter Rendezvous—Whitetail Deer" by Gary Sorrels, courtesy of the artist and Wild Wings; Lake City, MN 55041.*

suburban wood lots and brushy pockets within sight, sound and smell of roaring traffic, pungent hydrocarbons, neon lights and bustling human activity. They have increased their numbers in the face of hunting pressure that would have spelled extinction for a less resourceful animal. Where other species have faded before civilization's "progress," the whitetail has responded with an amazing ability to adapt to habitat deficiencies and to occupy new territories.

Aldo Leopold, founder of the profession of wildlife management in this country, was one of the earliest wildlife biologists to underscore this ability. As early as 1918, he argued against the "wilderness fallacy" by pointing out how white-tailed deer had been able to take advantage of many environmental changes wrought by the advance of civilization. Later, this was well demonstrated in Wisconsin, as reported by Susan L. Flader in "Thinking Like a Mountain."

**For the sportsman, the whitetail is a big game species inextricably webbed with traditional and pungent reminders of boyhood dreams—all fused with a spiritual aura that defies interpretation.**

Thousands of acres in central, southern and eastern Wisconsin—at one time cropped, grazed, drained or burned—had been allowed to revert to natural woodland, brush and marsh. By the 1960s, research revealed the number of fawns per doe was twice as high in the southern herd as in the northern. Few Wisconsin biologists realized—even in 1961 when a harvest goal of 75,000-100,000 deer per year was projected into the future—that in five years the upper figure would be left far behind. In 1967, 136,000 deer were harvested, largely as a result of further expansion in range and greater productivity in the southern herd. For example, one county in east central Wisconsin (which Leopold indicated had no deer on his 1929 distribution map) in 1968 had one of the highest total legal kills in the state. Since, many other states have experienced population growth and shifts similar to those in Wisconsin. Researchers have watched whitetails drift into new habitats: They moved to agricultural lands after the forest matured and the food supply faded; as forests were logged, they thrived on the new growth in the cutover lands.

The whitetail takes a back seat to none of the 378 species of mammals in North America—few species are as well attuned to their surroundings. For the whitetail, these surroundings include the picturesque coniferous forests of the North, the broad-leaved pine forests of peninsular Florida and the towering saguaro cactus deserts of Arizona and Mexico.

Because of the whitetail's broad distribution in a diversity of habitat types, biologists recognize no less than 30 races (forms that do not differ enough to be termed distinct species). Whitetails range from coast to coast in the United States (with the exception of most of California and a large portion of the southern Intermountain or Great Basin region) and from the latitude of Hudson Bay in Canada, south to the Isthmus of Panama.

The first identifiable description of the white-tailed deer, *Odocoileus virginianus*, was probably written by Thomas Hariot who, while in the service of Sir Walter Raleigh, visited Virginia in 1584. Nearly 200 years later, the first technical description of the Virginia whitetail was written.

At the time of the Lewis and Clark Expedition (1804-1806), little was known about the geographic range of white-tailed deer. Obviously, both Meriwether Lewis and William Clark were familiar with the whitetail in the Ohio Valley, but nothing in their diaries suggests they noted any distinction between the Virginia race and other races characteristic of the states bordering the Missouri River. They consistently referred to the whitetail of the lower Missouri Valley as the "common deer of our country." When they had traveled the Missouri as far as the Dakotas, they began to notice white-tailed deer of the West were different. On Sept. 16, 1804, Clark noted his hunters had explored near the White River in South Dakota and had mentioned seeing a "fallow deer" (one displaying a light, yellowish-brown coloration). On Sept. 17, 1804, Lewis wrote, "8 fallow deer, 5 Common and 3 Buffalo killed today." The entry suggests he recognized the fallow deer as distinct from the "common" Virginia deer.

Lewis and Clark first documented the whitetail in present-day Montana in the vicinity of the Poplar River. White-tailed deer were then hardly mentioned until the explorers reached the three forks of the Missouri River.

Regardless of the historical era, one should appreciate the fluctuating balance between a wildlife species and its habitat—the species changes and adapts as habitat conditions vary. The species must cope with such dynamic and competitive elements as vegetation, disease, predators, weather and the limitations imposed by man's activities. As one wildlife biologist commented, "Things in life—especially whitetails—are never static."

In a 1971 department publication, "Game Management in Montana," Gene Allen, chief of the department's Research Bureau, reported in the early 1940s whitetails were most abundant in the mountainous regions west of the Continental Divide, especially in northwestern Montana. In contrast, whitetails east of the divide were mostly concentrated along portions of the Missouri, Yellowstone, Milk and Musselshell rivers, with the greatest density in the Missouri Breaks of north central Montana.

Since 1941, whitetails have gradually extended their range and now are widely distributed in Montana. They are found on more than 38,000 square miles, or about 29% of the state's total land area (excluding national parks and Indian reservations).

Two urges dominate nearly all the waking activities of a deer—self-preservation and race preservation. These mainsprings of behavior are centered in the digestive and reproductive systems.

Deer have successfully evolved partly because of their elaborate digestive systems. They receive nourishment from an incredibly wide variety of plants—from mushrooms to poison ivy. Earl Atwood, in a 1941 *Journal of Wildlife Management* article, wrote that deer in the United States eat 614 plant species. Like cattle and sheep, deer are ruminants; they have four compartments in their stomachs, each with a particular function.

The deer's teeth cut, grind and soften leaves, grass, twigs or even plum pits into the pulpy mass the digestive organs require. Although they lack both incisors and canines in the upper jaw, they grasp twigs and cut them by pressing them between the sharply edged lower incisors and a heavy leather-like pad of flesh on the upper jaw. They remove twigs with a jerking movement, tearing them from the shrub.

While grazing or browsing, they swallow bits of browse, weeds and other foods. The food passes in balled-up cuds into the first "fermentation vat," the rumen. There, they mix with digestive juices containing billions of microbes (tiny plants and animals called "microflora" and "microfauna"). Deer are not born with a built-in supply of digestive microbes; they come from plants, soil and the mother deer. In one way or another—or perhaps several—the fawn will become inoculated with a variety of microbes. By the time it is two months old and browsing, it is well supplied. The microbes are comprised of many different species, depending on the plants deer eat. Furthermore, microbes are so specialized they work efficiently only on specific items in the deer's natural diet. Any sudden dietary change can stop the microbes' action and hasten serious complications.

**Where other species have faded before civilization's "progress," the whitetail has responded with an amazing ability to adapt to habitat deficiencies and to occupy new territories.**

If food is plentiful, a whitetail will fill its rumen in about an hour, and then retire to a secluded area where it can ruminate. With the aid of muscular kneading, the food is quickly reduced to a pulpy mass. The deer then regurgitates the mass of food back into its mouth and slowly "chews its cud." When thoroughly chewed, the food is then shifted back and forth from the rumen to the second stomach (reticulum), mixing with the juices. It then goes through the other two compartments (omasum and abomasum) for the final chemical phase of digestion.

The way a deer feeds, when it feeds (primarily during twilight and just before sunrise) and its system for processing food function well in the eat-and-run life of a prey animal. The period during which the animal is conspicuous and most vulnerable to predation is minimal. A deer can feed in safety, fill its rumen quickly and complete digestion under cover.

Whitetail habitat, as well as specific foods utilized in Montana, varies greatly on both sides of the Continental Divide. Factors affecting the whitetail's diet include: kind of vegetation, amounts available and seasonal changes in individual plants. East of the divide, whitetails are usually associated with deciduous tree-shrub vegetation on agricultural bottomlands or coulees, adjacent to both small and large streams. In such areas, the combination of agricultural crops interspersed with brushy coulees and wooded areas provides year-round food. Other important habitat types include rolling, ponderosa pine-covered hills with finger-like drainages and deciduous trees, and the upland sagebrush flats with shallow coulees adjacent to wheat and alfalfa fields. Important browse plants associated with such habitats include snowberry, chokecherry, aspen, cottonwood, skunkbrush, rabbitbrush, serviceberry, hawthorn and dogwood. Other browse plants of importance include rose, Oregon grape, buffalo-berry and sagebrush. Agricultural crops such as alfalfa, wheat and corn, as well as grasses and forbs, form part of a whitetail's diet during certain times of the year.

West of the divide, whitetails are usually associated with Douglas-fir and ponderosa pine forests. In such areas, whitetails depend heavily on the amount of edge (where two vegetation types come together) and availability of open areas in the forest canopy for much of their food. Since mature forests provide little on-the-ground vegetation suitable as winter food, abundance and distribution of openings in the forest canopy may limit deer numbers. Preferred browse species include Oregon grape, serviceberry, chokecherry, kinnikinick and alder. Important browse species in the winter include Douglas-fir, ponderosa pine, cottonwood and bitterbrush.

Researchers have documented a wealth of information on seasonal deer foods as well as nutritional requirements of whitetails. Unfortunately, little has been written about energy requirements. As most of us know, the great struggle in most animal's lives—including humans—is to avoid change. Physiological constancy is the first biological commandment. For example, a deer standing in deep snow on a bitterly cold winter day and reaching for a bit of browse is doing its unconscious best to maintain the internal *status quo*—to achieve what physiologists call "homeostasis."

One of the keys to winter survival for deer is the metabolic heat equation, the total of chemicals in living organisms which provide energy for heat, movement, growth, repair and reproduction. Most warm-blooded animals which are subjected to extended periods of extreme cold will turn up their thermostats to regulate their metabolic furnaces to burn fat reserves faster for greater heat production. In contrast, the whitetail's

*"The Sentinel—Whitetail Deer" by Maynard Reece reproduced through the courtesy of the artist and Mill Pond Press, Inc.; Venice, FL 33595. © copyright 1977 Maynard Reece*

metabolic regulator, the thyroid gland, actually slows body functions in winter. When food is scarce, energy needs are reduced and survival chances improve. This feature is unique to the whitetail and other members of the deer family, such as the red deer of Europe. Domestic animals of North America, such as cattle, do not seem to be able to slow their body functions in winter.

An enlightening piece of knowledge on energy requirements of whitetails under varying environmental conditions was recently uncovered by researchers from the New Hampshire Fish and Game and Animal Sciences departments. In their study on heat production of fasting white-tailed deer, researchers discovered the thyroid gland begins to shrink rapidly during early January, thereby slowing the metabolic activities. During this time, whitetails reach what biologists call their period of "fasting metabolism." The thyroid will be about 40% less active and deer will expend considerably less energy than they would during summer. This built-in safety valve which regulates seasonal metabolic changes in the whitetail may have evolved as a means of adaptation to winter food scarcity.

The other activity that dominates the deer's waking hours is race preservation. Conception rates are extremely high (about 99%). For example, captive and semiwild does in one well-documented study in Michigan bore fawns every year until they died at 17-20 years. A remarkable record of fawn production from a single doe was reported by Ralph Palmer in an article in *Journal of Mammalogy* in 1951. A captive doe in Maine produced 33 fawns in 15 years. At the ripe old age of 17, she still managed to bear twins. Although environmental conditions are more rigorous and demanding under natural conditions, nonconceiving does—young or old—are not very common.

From 30%-40% of the fawns in a healthy herd with an adequate food supply can conceive and give birth when they are only 1 year old. But on many deer ranges, fawn breeding may be negligible, if not completely absent.

Although reproductive variations exist throughout whitetail ranges due to quality and quantity of food, reproductive data from numerous states suggest fertility among does rises until about 4½ years, levels off through 7½ years, then declines with advancing age. Life's hazards in the wild may make a young deer old before its time; therefore, on many deer ranges there are few deer over 10 years old and fertility declines in the survivors.

When mortality factors are minimized, whitetail populations may increase rapidly. In fact, many people do not realize how fast deer multiply, even under less than ideal conditions. The fertility of whitetails was documented in a Michigan study. In 1962, 17 whitetails (six bucks and 11 does) were released on South Fox Island, a five-square-mile island in Lake Michigan about 20 miles from the mainland. Seven years later, the herd had grown to at least 500 deer. In addition, limited hunting had occurred and more than 40 deer—mostly trophy bucks—had been taken.

continued

The Dept. of Natural Resources (DNR) initiated special either-sex hunting seasons during 1969-70 and 570 deer were harvested. During spring 1971, a DNR census showed the island had about 200 deer and researchers expected the deer herd to double by that fall. In eight years, the initial 17 deer had produced a herd from which hunters had harvested more than 600 deer. Despite some intensive hunting during part of the period, the herd still contained over 200 whitetails. Wisconsin, Missouri, New York, Pennsylvania and Montana have also reported similar examples of this rabbit-like multiplication.

Breeding activity for Montana whitetails peaks in early to mid-November. During the rut, all but a few of the rules of caution that operate the rest of the year are suspended and the reproductive urge takes center stage. During the height of the rut, the buck's swollen neck muscles add to his pugnacious appearance and sparring sessions with shrubs and small trees polish his antler tines. Just before the rut actually starts, the bucks quit tolerating each other and sparring is no longer good-natured play. For the first time in the year, food becomes of secondary importance and the bucks may lose body fat rapidly.

Bucks become sexually mature when they are 1½ years old and are in breeding condition from September-February. Does, in contrast, are not constantly receptive to bucks during this time because their estrus or heat period only lasts about 24 hours. If a doe is not successfully bred during the first estrus, she will come into heat again in about 28 days. Nearly all does are bred in their first estrus; only a few have a second estrus. A doe can have as many as three heat cycles in a single season, ranging from late September to mid-December.

The whitetail buck is polygamous and there is no permanent pairing. A mature buck mates with as many females as will accept him, while each doe accepts any buck in her brief day of heat. During the rut, bucks plunge over the range with little caution until a diminished flow of hormones signals a temporary end to the sex drive.

The gestation period lasts slightly less than seven months. Beginning in early June, does begin to have their fawns, with the peak about June 15. When her time comes, the doe quietly leaves other deer and seeks solitude. If she's a 2-year-old (bred as a yearling), she can usually expect a single fawn. Adults will normally have twins, and perhaps an occasional set of triplets. Quadruplets are rare and one fawn is usually much smaller and often dies at birth or soon after. Whitetail fawns weigh from 4.5-8.5 pounds at birth and approximately 51% are males. A fawn grows rapidly; by 10 days, it is easily able to traverse rough terrain.

A newborn deer, like other young mammals, lives on its mother's milk, which is quite rich in nutrients. Whitetail milk has more than twice as many solids as dairy cow milk. Both fat levels and protein content are nearly three times higher. Although fawns can handle soft browse at the end of two to three weeks, they must have milk for about 12 weeks. Fawns begin eating some vegetation almost immediately, with the proportion of vegetation and milk gradually changing until the fawn is weaned.

By October, or perhaps even earlier, the fawn has been weaned and can forage on its own. A fawn does not usually depend on its mother by hunting season, sentimental thinkers to the contrary. A doe "dries up" about one month after nursing stops. A doe that is "dry" in November could have had a fawn (or fawns) the previous June. A fawn, however, usually remains with the mother through winter, unless separated by death or accident.

The immediate outlook for the whitetail in Montana appears bright, especially in eastern Montana. Whitetail hunting presently represents a recreational resource not fully tapped. Until recently, the whitetail has been the secondary deer species in Montana, averaging 25%-29% (1965-74) of the total deer harvest. That status is rapidly changing as shown by a 1975-77 hunter survey in which 37% of the state's total harvest was whitetails.

The long-term outlook for the whitetail is uncertain. Of all the criteria necessary to manage a deer herd, by far the most important are those related to habitat. Retaining habitat for deer in Montana will continue to present a challenge to the wildlife profession. It will require imagination, innovation and sound, meticulous research and management.

Presently, about 75% of the statewide whitetail harvest in Montana comes from private lands. And this is the crux of the problem.

With rapid changes in agricultural practices, agricultural economics and farm and export policies, the farmer is rapidly becoming a businessman concerned with investment input compared with profit output. Many farmers with small acreages have found it impossible to stay afloat. So they have sold their land to bigger, more efficient, operations. Costs have increased while the price received for farm products has not risen correspondingly. Heavy investment in equipment, supplies and land make it mandatory that every acre produces the maximum—or the farmer will not make a profit. Uncultivated land with crop potential is a luxury the farmer no longer can afford. Consequently, wooded areas, brushy draws, sagebrush flats and other areas important to whitetails are being converted to crop land.

In a free enterprise system, the man who makes his living from the land can "grow" wildlife instead of sugar beets or corn if he prefers. But wildlife must pay a return if he is to forego raising farm products. With an ever-increasing world population, economic pressures placed on the private landowner will mean less idle acreage and more loss of habitat. We are rapidly approaching the point where we might have to compare the value of a deer herd to the value of winter wheat or any other competing crop. Although dollars provide a direct unit of comparison, there is really no acceptable technique by which a dollar value can be assigned to wildlife. So we must re-examine the "free" use of private land by wildlife—in spite of the bad taste that philosophy leaves with some recreationists.

For now, Montana offers some quality whitetail hunting. That is likely to remain, as long as recreationists yearn for an extraordinary personal experience centering on a gray, heavy-bodied animal with a hayrack on one end and a flashing white tail on the other. ■

# Dear F&G

## Wilderness Classification Advocated

Our association was pleased to see a special issue of *Montana Outdoors* devoted to wildlife and wilderness. We, along with other wildlife groups, are concerned for the future of wildlife habitat, especially for the larger game species which need land with wilderness characteristics to survive the growth and development of Montana. Just about everyone seems to have some interest in our remaining wild lands, either for exploitation or preservation, probably because they are the only lands left that have not been subjected to our civilized "multiple-abuse" use.

Our group has many reasons for advocating wilderness classification of our suitable wild lands. While we agree that wildlife does not need the classification as outlined in the Wilderness Act *per se*, the 1964 act is the only here and now vehicle that affords protection for the habitat of our most important wildlife. Consequently, the association directors asked me to express our concern about the lack of enthusiasm expressed for wilderness in "The Director's Column" and in "Wilderness and Wildlife" (Jan./Feb. 1978).

One of our concerns was that, at times, the director's statements were almost like others we hear. The timber and motorized recreation industry spokesmen often leave the impression in their public statements that all of Montana is going into a wilderness, and everything, now also including game management, will go to hell. While Montana was all a wilderness once, I seriously doubt that more than about 7% might qualify for wilderness classification now. Such a small amount could hardly wreck the economy, or wildlife management, or the motorized recreation industry that depends on use of gasoline for entertainment.

The premise that wildlifers should be against wilderness classification because of the "total" exclusion of mechanized equipment and fire control is an interesting one for a Dept. of Fish and Game director.

Why has it suddenly become "impossible" to use certain techniques to manage wildlife in wilderness? Mechanized equipment, while never completely excluded from wilderness, has been difficult to use in wilderness. Hunters, wardens and biologists have been using and working wilderness for years without free use of mechanized equipment. Maybe the director should read some of the department reports and outdoor magazines to see how it was done. If the department employees are now reluctant to leave their motor vehicles and go on foot or horseback among the wildlife when there is a need for it, they should consider truck driving a more suitable occupation. The pay may even be better.

The director's comments about fire control leave us the impression that fire control is a Forest Service (FS) phenomenon practiced in wilderness areas only. We have always been told that winter wildlife range is most critical and in short supply, especially for larger game species, and most elk winter range, for example, exists outside wilderness areas where fire is more diligently controlled. How many acres of winter range has deteriorated because of fire control? We also note, with approval of course, that a considerable amount of license money has been used to buy elk winter range. This land is now under the director's control. On how many acres is fire used as a game management tool?

It was amusing to note that a phony fire control argument was used by the FS and the Dept. of Fish and Game to exclude certain areas from the Great Bear wilderness proposal. Research by the Center for the Public Interest in Bozeman indicates, "There is a strong argument that the Wilderness Act endorses the practice of sound fire ecology," and we suspect fire control as practiced today will cease in designated wilderness long before it does on other FS lands.

We have long suspected that most game management problems associated with wilderness, *de facto* wilderness and national parks are mostly self-generated by government itself, the Gallatin elk herd being a case in point. This herd ranges on Yellowstone National Park land, national forest, Dept. of Fish and Game and private lands in the Gallatin and Madison Mountain ranges. A strip of developed private land (homes and commercial) occurs along the Gallatin River and certain tributaries. The elk spend as much time as they can in the park and seem to avoid other areas, especially the developed areas, until winter.

Game management is a problem, and the Fish and Game Commission regularly enters into a cooperative program with the FS and National Park Service where the annual hunter harvest and number of wintering elk are agreed upon. The management plan is simple enough—keep elk numbers at a level that can be supported by the natural forage on the winter range. Usually, the elk do not leave the park until after the traditional October-November hunting season and a later season is regularly scheduled.

Almost as regularly, the later season is objected to by certain residents who have taken up land on former elk winter range in the developed area. Some years, the objectors even go in delegations to the governor's office to complain about the elk season. On occasion, the Fish and Game Commission gets ready to drop its policies and let the commercial establishments, the anti-hunters and the hay feeders who live on the elk winter range have their way. Sometimes the season stays open. And sometimes the season is closed, which quiets the complaints temporarily, at least until the next administration takes over. Just about every administration has been tested for its dedication to good game management principles and some have been found wanting. Each administration thinks it has a new problem on its hands. But according to Allen Lovaas in "People and the Gallatin Elk Herd," game management programs have generated controversy for nearly 100 years. And the point is that game management problems are made "impossible" by vacillating administrations and not the presence of parks or wilderness areas.

The idea that "backcountry as an alternative to wilderness" can provide greater wildlife opportunities has little merit and is still largely a figment of someone's imagination. Backcountry has not been officially defined and not mentioned as such in the "Code of Federal Regulations" or the "Forest Service Manual." Perhaps the director is thinking of the "special areas" regulations? While not specifically for wildlife management, the special areas regulations might possibly be adapted to wildlife management as a complement to wilderness designation—for example, in a situation where an important segment



recycled paper

of an elk range might not qualify for designation as wilderness under the Wilderness Act.

As the director pointed out, special areas (backcountry, if you wish) lack statutory protection. Without such protection, wildlife habitat is no more secure under a backcountry designation than it is under other FS multiple-use management that does not include wilderness.

Our association feels the director should reconsider his nonchalant attitude toward wilderness. We still have a few choices left for important game species, between wilderness designations and multiple uses that have a potential for habitat degradation. We do not need that snow job about some species of wildlife not benefiting from a wilderness designation. We all know that apparently robins do best around suburban strawberry beds, but Montana is not particularly noted for robins. Much of the sportsmen's license money has been spent on wildlife such as elk, grizzly bear and bighorn sheep which need large tracts of wilderness to survive civilization. This is as it should be. In how many places today can you find viable populations of the larger game species in the wild that are not associated with designated wilderness, *de facto* wilderness or national parks? Our organization expects the Dept. of Fish and Game to be a partner in protecting habitat. We hope the future holds more than just wildlife in zoos.—*Perry H. Nelson, secretary, Gallatin Wildlife Assn.; Bozeman, Mont.*

## Algae Mean Fish Die

This letter is a result of an article, "Toxic Algae Invade Hebgen Lake," appearing in the Nov./Dec. 1977 *Montana Outdoors.* It is being written because I would like to see Montana maintain its outdoors and because I have some knowledge of the subject.

My background is in chemistry and since 1960 I have been experimenting with water and fish and what keeps them alive. With chemical additions to water, I have raised rainbow trout from eyed eggs to four inches long with an 11% mortality. In this state, mortality runs to 60%.

Based on my experience, algae result from contaminated water. They are God's way of trying to make unsuitable water suitable for fish. The water may be contaminated in other than the normal sense. In my experimentation, I have been able to grow algae or to stop them depending on the type of dissolved solids and their condition. Any inorganic materials which are not in the right state will result in algae, with the sun acting as a catalyst between the dissolved solids and the algae. It may do well to go back upstream to see if there has been a new source of dissolved solids introduced into the stream.

My experience would say that if you have algae, you also have fish death. These fish will die and sink to the bottom. If turtles or other fish open up the fish stomachs, the dead fish will not rise later and will never be seen.

The article commented about the smelly algae. It goes without saying that the stuff smells, but I would say that it is the dissolved solids which smell and not the algae.

My hunting in Montana has included four trips to the Spotted Bear area south of Hungry Horse Reservoir. This year I would like to introduce my 20-year old son to Montana hunting.—*E. O. Ganslein; Alliance, Ohio*

## A Good Place to Hunt

Enclosed is a photo of an elk shot by one of our customers last year. This bull was taken in southwestern Montana by Jim Granger, Jr. of Fort Benton, Mont.

Mr. Granger is an experienced elk hunter, but this is the finest bull he had ever seen. I must say it is the most massive bull we have ever encountered. In fact, the base circumference of the antlers is greater than any elk in the Boone & Crockett book (an official record of North American big game trophies) and if elk qualified for the record book by weight, this set of antlers would probably outweigh the world record.

The head itself missed the minimum inch requirement as the horns were not particularly symmetrical.

As a matter of interest, there are more elk from Montana in the record book than from Idaho, Wyoming, New Mexico and Washington put together.

An antelope was shot in eastern Montana last year that will be the new #2 world record. Montana must be a good place to hunt.—*Jack Atcheson, president, Jack Atcheson & Sons, Inc.; Butte, Mont.*

## Education Is Common Sense

I wanted to rebut certain points raised in the mini-editorial and the hunter education article in the Nov./Dec. 1977 *Montana Outdoors.*

I have never read or heard of any study that claimed by making an activity illegal, it would prevent that activity. It seems that is what the mini-editorial is implying when it states that Montana doesn't require (by law) firearms users to unload and case their guns when they're in vehicles.

I do not think it is "common sense" to enact legislation that would not solve the problem and be almost impossible to enforce. It *is* common sense to educate the firearms user so he will use common sense when he handles a firearm. Part of that common sense is to unload the rifles before one transports them in a vehicle. I do not see how casing the firearm will

make it any safer. Perhaps to help educate the hunters, you might consider printing some articles in *Montana Outdoors* dealing with firearms safety, if you are so concerned about the subject.

In his article, Jim Ramsey states, ". . . In addition, Montana law allows anybody who isn't a felon to carry and use handguns. These two weak spots in Montana law give conscientious firearm owners a bad image." This portion of the article seemed to imply that handgun users were not conscientious and gave other firearms owners a bad image. Where can you back this assumption up? Just because one owns a handgun doesn't automatically make him an itchy fingered, mad dog killer anymore than owning a rifle makes one an assassin. It sounds like Mr. Ramsey would like to outlaw handguns.—*Lloyd R. Brown; Butte, Mont.*

* * * *

I am writing in objection to your mini-editorial on page 4 of the Nov./Dec. 1977 issue of *Montana Outdoors.* The editorial is in favor of a law requiring that firearms be unloaded and cased while in vehicles. The absence of this law is referred to as an oversight.

It seems that whenever a particular state is without a law another state has, the state without the law is labeled as "negligent." To keep up with the neighboring states, it has to pass one. I think this is sad. I like to feel the reason Montana has not enacted such a law is because Montanans understand firearms and their use well enough so they don't need the legislature to tell them when to load and unload their firearms.

I have lived my life in four states: Wisconsin, Minnesota, South Dakota and Montana. Wisconsin and Minnesota have laws requiring that a gun be unloaded and cased while in a vehicle. South Dakota and Montana do not. I worked for four years in the Holy Rosary Hospital Laboratory in Miles City, Mont. I do not recall a single case during Montana's four-week deer season of a person who was shot accidentally while hunting. I also worked for seven years in a small hospital laboratory in mid-Wisconsin. During Wisconsin's 10-day deer season, our hospital averaged from two to four shooting accidents per year related to deer hunting. Yet, in Wisconsin, a firearm must be unloaded and cased to be legally carried in a car.

I think it would be a great and unnecessary hardship on the farmers and ranchers of Montana to have to unload and case the guns they carry in their pickups ready for quick action against coyotes, etc.—not to mention the nuisance it is for a hunter who is moving a mile or two down the road to have to unload and case his gun and then load it again after a two-minute drive.

If statistics indicate that loaded firearms inside vehicles are a real hazard, then let's only legislate what we need. Require empty chambers on all firearms carried in a vehicle. Forget the unloading of the magazine and forget the case. They don't help anything and they are a pain in the neck.—*Bill Spicer; Groton, S.D.*

## Excellent Publication

In every issue of *Montana Outdoors,* the pictures and writing are excellent, as is everything in the whole magazine. Keep up the good work.—*Debbie Raiter; Cannon Falls, Minn.*

# Editorial

## Enforcing Park Regulations

As the Dept. of Fish and Game prepares for summer recreation within its state parks system, the staff seeks ways to improve the quality of service to visitors to its nine state parks, 55 recreation areas, 13 state monuments and 140 fishing access sites.

In recent years, visitors have said that enforcement of public use regulations needs greater attention and effort. This concern has been voiced personally to park managers and caretakers, through the mail to the governor's office and department administrators and in public opinion surveys which have been conducted by department planners. Visitors state they want to be free from unpleasant or unlawful activities taking place around them and want to be assured they can use the recreation areas in safety. They also dislike vandalism to park features and facilities.

The department, too, has been concerned. Until recently, efforts to provide greater surveillance at the sites and to enforce park regulations have been stymied because wardens were paid primarily from hunting and fishing license revenues. They did not have an appropriate source of income to support efforts in the parks.

When the Parks Division was transferred from the Dept. of Highways to the Dept. of Fish and Game by legislative action in 1965, it had no enforcement personnel. It had to rely on the Enforcement Division within the Dept. of Fish and Game—a division which already had vast responsibility for protection of fish and wildlife, hunter safety, investigating hunter accidents, assisting in trapping and transplanting wildlife, landowner relations, as well as other administrative duties. These activities were all appropriately supported by sportsmen's licenses. However, game wardens gave attention to enforcement of parks system regulations when that activity could be accomplished in conjunction with other responsibilities. There was no special effort devoted exclusively to the park system because of lack of proper financial support.

Until recently, visitation at state parks was light and problems and conflicts were minimal. However, both visitation and problems have grown. Now, special efforts are required.

To address the problem, the department requested appropriations from other parks revenues to support law enforcement efforts within the state park system. The 1977 legislature granted this request. Wardens are now able to give special attention to parks problems, using revenue other than sportsmen's dollars.

To supplement the efforts of enforcement personnel, the department will continue to provide resident park managers and caretakers at some sites, such as in the Flathead Lake area where visitation is extremely heavy and where resulting user conflicts are more frequent. However, these people do not have law enforcement powers. At some of these control sites, caretakers will maintain camping limits at a reasonable level and close the park at regular hours or when its capacity has been reached. Such closures provide park users with a peaceful night's sleep, free from outside mischief, unreasonable crowding or the activities of those who arrive late.

While this management technique may be new to most Montanans, it has been used by the National Park Service for years and by other state parks systems where use has been

heavy, especially at sites near metropolitan areas.

Protecting users from unlawful activities or night-time nuisances addresses only part of the overall enforcement problem, however. During the day, conflicts between legitimate park uses, especially under crowded conditions, can be very annoying. For example, the following situations can spoil outings: The fisherman and water skier compete for the same quiet cove; a speedboat competes with a troller; swimmers and rafters leave swimming areas and enter boating channels, or large groups become disorderly, causing annoying conditions for their picnicking or camping neighbors. Conscientiously applied, the system's public use regulations can solve most of these problems.

In most cases only common sense and courtesy are necessary. Suprisingly, the most common complaint results from pets not being restrained by leash as the regulations require. The second most prevalent complaint results from using park roads and trails as tracks for the "cruising" of motorbikes, automobiles and other recreational vehicles. The noise, dust and danger created by such activities have spoiled many outings.

Vandalism to park facilities or natural features is a special problem in some areas. Sites near metropolitan areas are especially vulnerable. Cleaning graffiti, replacing stolen signs and repairing burned or smashed rest rooms are all expensive. Increased enforcement will no doubt diminish this activity.

While vandalism to facilities can be repaired, vandalism to natural features is often irreparable. Spraying paint on historic Indian writings and cutting large green trees are examples of losses which cannot be recovered. Hopefully, such malicious mischief can be curbed by increased enforcement and by better public understanding of the values being destroyed.

Litter poses a less damaging, but still a very costly, problem. While the public is becoming more conscientious each year, the fact that park use is increasing causes the problem to worsen. As a result of public desire, legislative support and the department's response to those expressions, visitors to the state parks system will see more enforcement officers this summer. In special problem areas, county peace officers will assist under special contract arrangements and at one park, security guards will be employed. The presence of law enforcement officers will go a long way toward gaining compliance.—*Ray Berntsen, Elmer Davis*

## Montana Recreation and Park Regulations

Regulations and laws relating to fish, game, parks and recreation were developed to protect fish and wildlife resources and their habitat from willful or negligent destruction. To assure compliance, wardens patrol the state's lands and waters.

Upon entering lands administered by the Montana Dept. of Fish and Game, take a few minutes to read posted regulations which are designed to make your stay a more enjoyable experience.

Some of the more important regulations are listed below:

- discharge of weapons prohibited,
- confine pets to leash,
- observe speed limits,
- stay on roads,
- park and camp where designated,
- heed 14-day camping limit,
- confine fires to fireplaces,
- preserve natural features,
- put litter in its place,
- night closure in designated areas,
- launch boats in launching areas,
- swim within orange and white buoys,
- permit required for groups of more than 50 persons,
- overnight or seasonal camping permit required where posted.

The above is only a synopsis of a few laws and regulations governing recreation area use. Regulations which are in effect are posted at each recreation area and should be read when entering the site.

For a complete copy, write: Montana Dept. of Fish and Game, 1420 East Sixth Ave.; Helena, MT 59601.

# Salmon and Placid Lakes: Montana's Newest Parks

## by Ron Holliday

Enormous and all-powerful, the western Montana glaciers of the Pleistocene Era slowly inched their way downhill, scouring everything in their paths. About 9,000 years ago, these huge rivers of ice melted as the climate gradually warmed. The glacial melt carried sand, gravel and other debris downstream, depositing it here and there. Water backed up behind the material deposited by the receding glaciers and formed the natural lakes and potholes common to much of western Montana.

One drainage which underwent this type of glaciation is the Clearwater River Valley. Flanked on the west by the majestic Mission Mountains and on the east by the Swan Range, the Clearwater and its tributaries form some of the most scenic and heavily used lakes in the state. Their names—Lake Alva, Lake Inez, Rainy Lake and Seeley Lake—conjure up visions of crystal clear water, heavy forests and majestic backdrops of snow-covered peaks.

Two of the southernmost bodies of water in the Clearwater "chain of lakes" are the "newest members" in the state park system—Salmon and Placid lakes.

Salmon Lake, containing about 720 surface acres, is formed by the Clearwater River. It is situated about nine miles south of Seeley Lake and Route 209 flanks its eastern shoreline. Placid Lake, actually not in the Clearwater chain of lakes, is formed by Placid Creek, a Clearwater River tributary. It is situated about 10 miles northwest of Salmon Lake, about five miles west of Route 209. It contains 1,200 surface acres. Both lakes are found in northeastern Missoula County. (See map.)

continued

*Champion International donated 42 acres on Salmon Lake to the citizens of Montana. Salmon, along with its neighbor, Placid Lake, will be managed within the state park system. F&G photo: Bill Thomas*

Surely, these lakes were pleasing to the eyes of the first people who saw them—perhaps 8,000 years ago—and to all the generations which followed. We do not know the identity of the first Europeans to visit the Clearwater country, but they were probably trappers in the early or mid-1800s. The area was not settled until the early 20th century when its virgin forests attracted loggers. For years, logs were floated down Placid's outlet, Owl Creek, through Salmon Lake and then down the Blackfoot River to sawmills near Missoula. This colorful page of our state's history passed from view in the 1930s when forest access roads penetrated the Placid Lake area from the east. During this era, cabins appeared on many of the lakes in the vicinity and recreational use of their waters became a part of the Montana way of life.

After the turn of the century, The Anaconda Co. bought thousands of acres of western Montana forest to supply timber to its Butte underground mines. At one time, its holdings amounted to over 1 million acres, and included most of Salmon's and Placid's shorelines.

In 1972, Champion International Corp. purchased most of the remaining Anaconda Co. holdings (excluding lands surrounding Georgetown Lake and the city of Anaconda). Champion International continued to allow public use of the shorelines of both lakes. Many recreationists probably assumed the most heavily used shorelines were publicly owned, but they were not.

As public use grew—along with associated problems such as litter, garbage, sanitation and overuse and subsequent erosion of fragile shorelines—Champion International faced a crossroads: What should the corporation do with these properties? How should they be managed? Should they be retained or not?

Since the corporation's business is timber management, not recreation management, the following alternatives probably were considered: (1) the corporation could ignore the problems associated with recreational use; (2) it could post the land against trespassing, effectively closing Salmon and Placid lakes to public use, or (3) it could subdivide the lake front property for cabin or home sites. This would not only solve recreational management problems but would also reap a handsome economic return for the corporation.

Instead of initiating any of the above alternatives, the company chose another: Without strings attached, it donated 42 acres on Salmon and 32 acres on Placid to the people of Montana. Valued at more than a half million dollars, the areas will be managed within the state park system.

Champion already permits public use on most of its 680,000 acres in western Montana, asking only compliance with a few reasonable, common sense restrictions.

For the past several years, the corporation has also participated in a cooperative management study of the Blackfoot River corridor upstream from Bonner. Champion allows public use along more than 20 miles of this stream.

In acknowledging these and other accomplishments, Gov. Thomas L. Judge said, "Champion International's donation to the state of Montana is one of the most generous, most selfless acts that any corporation has ever made for the state. . . . I would just hope that in the future other corporations would follow the example of Champion International and realize they have something to offer Montana and can put something back into this state. Champion has set an outstanding example for other corporations to follow."

By utilizing the cost sharing capability of the Federal Land and Water Conservation Fund, the department's Parks Division used the value of this donation to receive an amount equal to the land's value for site improvements.

Division planners formulated master development plans for both sites, attempting to emphasize existing use patterns and natural features. Boat ramps, courtesy docks, modern toilets, drinking water, interpretive exhibits and organized camping, day use and parking facilities will also be built. Construction is scheduled to begin this fall on both areas.

The sites will be managed the same as most other recreation areas within the state park system. A caretaker will be stationed at each area during the heavy recreation season. Camping will be limited to 14 consecutive days and the caretaker will close the gate when each area's capacity is reached.

These two areas will no doubt fill recreation needs of Montanans for many generations to come. The department is fortunate to be able to preserve them for public use. ■

*For years, logs were floated through Salmon Lake and then down the Blackfoot River (below) to sawmills near Missoula. This page from Montana's history passed from view in the 1930s when forest access roads penetrated the Placid Lake area (left) from the east. photo: University of Montana Archives*

# Epizootics: Mystery Deer Diseases

## by Ken Walcheck

## illustrations by Kelly Vollrath

ON AUG. 13, 1976, a concerned rancher called the Miles City regional office of the Dept. of Fish and Game. The caller reported a number of white-tailed deer were mysteriously dying from what appeared to be a highly fatal disease. As the hot, dry summer progressed, reports were also received in the Glasgow office and the department's Wildlife Research Laboratory in Bozeman.

Most of the deer died without anyone seeing them while they were ill. But a few witnesses said the deer seemed to be in profound shock before death. The observers noted loss of alertness, extended necks and drooping ears and labored breathing interspersed with coughing. In some, observers saw a ball of foam flecked with blood near the nose and mouth. Evidently a few deer struggled violently before dying because their bodies had bruised and scraped areas, probably incurred as they thrashed on the ground, broke branches and tore up patches of grass and soil.

Typically, several deer were found close to one another, lying in or near streams, reservoirs and stock ponds. However, not all deer died near streams. Some died in agricultural areas and sagebrush flats on the highlands, sometimes a long way from water. One observer watched a disoriented whitetail submerge itself up to the neck before falling dead in the water. But whitetails weren't the only victims. At least in the northern area, some mule deer were also afflicted.

The physical condition of many of the deer seemed excellent at the time of death, suggesting the disease was acute and didn't last long.

The symptoms and conditions suggested the deaths were caused by an epizootic of a hemorrhagic disease. The most common hemorrhagic disease affecting white-tailed deer is known as epizootic hemorrhagic disease (EHD). As the name suggests, it is characterized by extensive hemorrhaging. An epizootic is a disease that spreads quickly among mammals, occurring only in a large, susceptible population when appropriate conditions exist for transmitting the agent causing the disease. EHD strikes primarily white-tailed deer and results in high mortality. Minor losses have been recorded for mule deer and pronghorn antelope.

Although deer die-offs from EHD-like diseases have occurred in various sections of North America since 1890, it wasn't until 1955 that the causative agent, a virus, was first isolated in New Jersey.[1] Fatalities from this epizootic outbreak totaled nearly 1,000 deer. The virus has since been isolated during EHD outbreaks in Michigan, North and South Dakota, Washington, Indiana and Alberta. In the southeastern states, the disease is called "hemorrhagic disease" because researchers believe both the EHD and bluetongue (BT) viruses are involved in the outbreaks. Commonly known as "bluetongue" or "blacktongue," widespread epizootics occur almost annually in Georgia, Alabama, North Carolina, Arkansas, Florida, Kentucky and Tennessee.[2] In the West, periodic EHD outbreaks have occurred in the Dakotas, Missouri, Nebraska, Oregon and Montana.

The first probable EHD deaths in eastern Montana were documented in 1961, with 11 areas reporting die-offs. Scattered reports of dead deer from unknown causes—possibly EHD—were received during 1970 and 1971, but no large-scale die-offs occurred until 1976. During the 1976 situation, die-offs were reported in 34 areas in eastern Montana, with most outbreaks in McCone and Powder River counties.

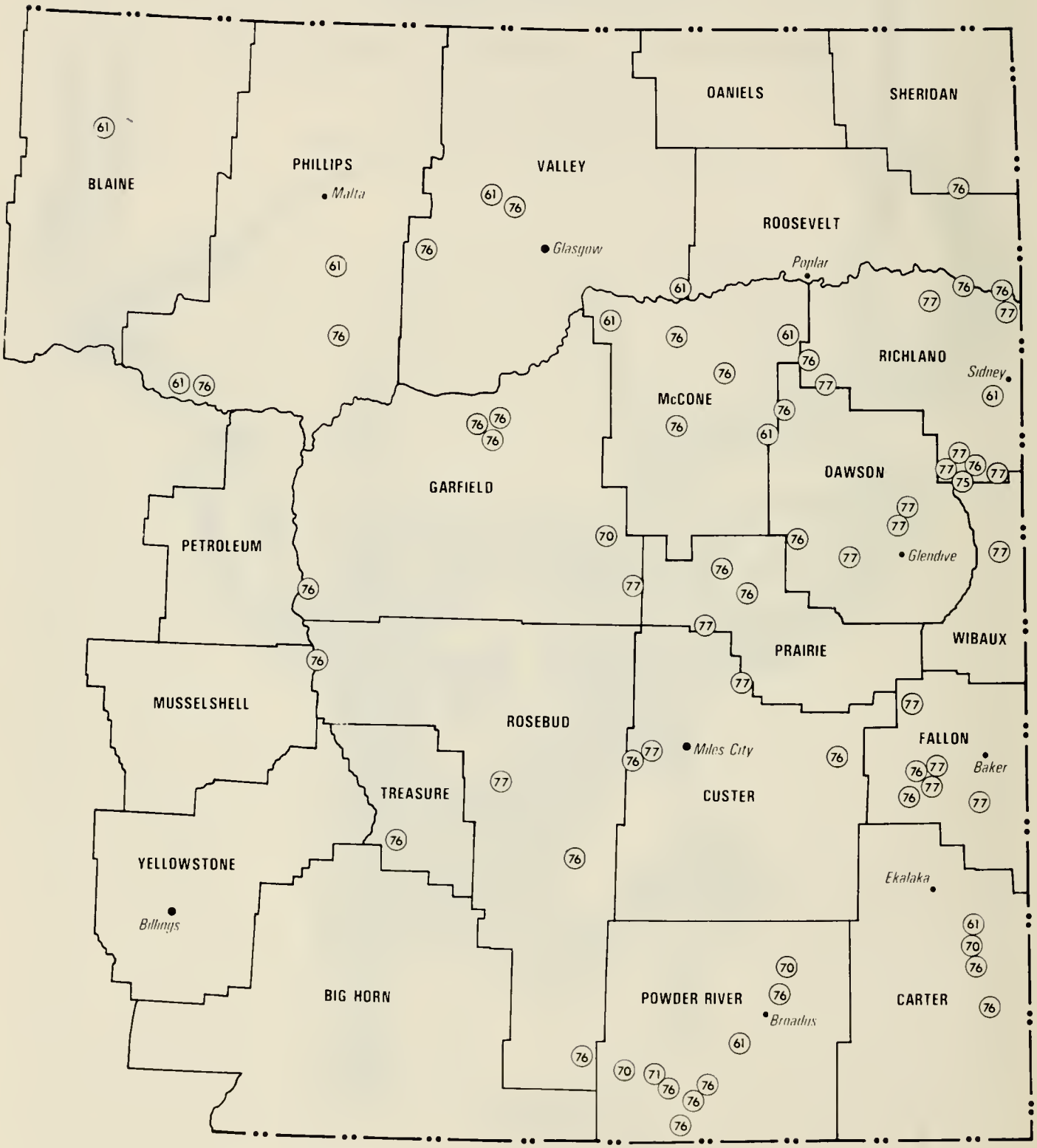
In an attempt to diagnose the disease, blood and tissue samples were forwarded to the University of Wisconsin's Veterinary Science Laboratory, the National Animal Disease Center in Ames, Iowa and to virologists in Alberta, South Dakota and Ohio. Additional examinations of live animals were conducted by the Montana Dept. of Livestock's Animal Health Division and by the Veterinary Research Laboratory at Montana State University, Bozeman. None of the diagnostic laboratories was able to isolate the causative organism.

Outbreaks flared again in 1977 with 19 areas reporting fatalities. The largest die-offs occurred in the Sidney-Glendive areas along the Yellowstone River.

Jon Swenson, wildlife biologist for the department in Glendive, conducted field investigations during summer 1977 on about 16 miles of white-tailed deer habitat along the Yellowstone River near Intake. He estimated at least 190 whitetails had died from what appeared to be EHD—about 12 deer per square mile, or roughly one-third of the population.

During 1961-77, EHD was suspected in 71 areas of eastern Montana. The outbreaks occurred during the summer and early fall (August, September and October)

# Occurrences of Hemorrhagic Diseases (1961-77)



with the greatest number of deaths before the first hard frost. Probably only a few antelope and mule deer died from the disease during this period.

EHD is a virus afflicting several species of wildlife. It appears suddenly in mid- to late summer as an epizootic and then periodically disappears and reappears. So, several perplexing questions arise: Where does the virus come from? To where does it temporarily disappear in the field? How is it maintained or carried over the winter?

Researchers are fairly certain EHD outbreaks are associated with hot, dry weather. Some factor—such as a vector (insects or other animals that transfer disease-causing organisms), an alternate host or contact with a virus which causes or allows transmission of the disease—may be more prevalent in this kind of weather.

Even though a relationship seems to exist between outbreaks and temperature/precipitation patterns, hot, dry weather does not guarantee an outbreak. Climatological records (1961-77) for southeastern Montana during August and September indicate 1963, 1967 and 1969 were hot and dry, yet no documented outbreaks occurred. As suggested by Stephen H. Richards, disease research biologist for the North Dakota Dept. of Game and Fish, a sudden change in temperature or barometric pressure might trigger the disease.

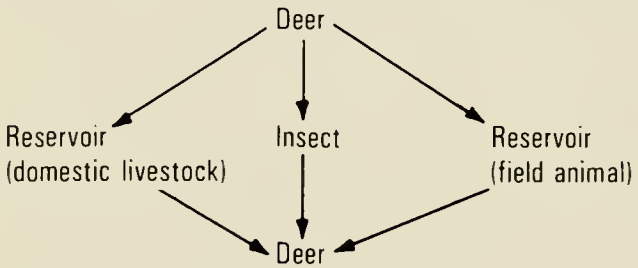
The marked seasonal incidence of EHD has resulted in speculation the disease is transmitted by insects—mosquitoes, deer flies, gnats or midges. Some researchers rank members of the genus *Culicoides* (biting midges) as the leading contender because EHD and BT virues have been isolated from *Culicoides* in Africa. Dr. Kenneth L. Quickenden, vector control section supervisor for the Montana Dept. of Health and Environmental Sciences, stated in a personal communciation that information on *Culicoides* species, distribution and abundance is sketchy for Montana.

The virus cycle has many gaps which must be investigated. (See diagram.) Researchers speculate the presence of both vectors and other hosts, such as domestic livestock or rodents (which serve as reservoirs), are required for perpetuation and spread of the virus in nature. Since life cannot develop from other than pre-existing life, all infecting organisms must have certain places where they can live and multiply without damaging their host. Without these "safe" places, they would die out. These places of usual growth and multiplication for disease-causing organisms are called the "reservoirs of infection."

The role of domestic animals as reservoirs in the EHD virus-host transmission cycle has been investigated by Dr. G. C. Parikh, associate professor of bacteriology, and his associates at South Dakota State University. Tests on more than 2,000 cows and pigs indicated approximately 10% of the animals tested positive for EHD antibodies (specific substances produced by the body which inactivate or destroy the virus, thereby providing immunity).[3] The researchers concluded that certain domestic animals, as well as wild animals such as mule deer and rodents, probably play a significant role in transmitting the disease.

Post-mortem examinations (necropsies) on numerous deer in Montana and elsewhere reveal strikingly similar results. As the skin was removed from the carcass, numerous pinhead-sized hemorrhages on the skin, fat and muscle, especially along the loin, hindquarters and brisket areas, were revealed. When researchers opened the abdominal cavity, they often saw an excessive amount of clear, straw-colored fluid. Internally, the most striking and consistent observation was the extensive paintbrush spattering of many small to massive purplish-red hemorrhages on the surfaces of the stomachs and intestines. Varying degrees of hemorrhaging had occurred in the lungs, nasal passages, bladder, spleen, trachea, kidneys and, to a lesser degree, in other organs. Lymph nodes in the intestinal mesentery membranes were often dark and engorged. The heart sac usually was filled with a pale yellow fluid and the heart was frequently speckled with splotches of hemorrhages. Often, portions of heart muscle were destroyed. In some animals, free blood (blood that had escaped from the blood vessels) was evident in the intestines, and bleeding from the rectum was observed. Post-mortem examinations seemed to indicate the animals had bled into their own tissues.

**Possible Routes of EHD Virus Transmission**




This disease has also been studied in experimentally induced infections of white-tailed deer.[4] The extensive hemorrhages which occurred in every infected deer led Lars Karstad (D.V.M.) and associates to suspect that a deranged blood clotting mechanism might be partly responsible. The normal blood clotting time of three to five minutes in healthy deer was clocked at 23 minutes in one experimentally exposed deer. Infected animals became feverish about the fifth day after viral exposure. Body temperatures rose sharply to about 105°F (40.5°C), then decreased gradually until death within the next two to five days. This could explain why most of the deer die near water or actually in it. After the onset of the fever, animals rapidly passed into a shock-like state in which they were insensitive to external stimuli, quit eating and rarely drank. Just before death, they experienced extreme weakness, rapid heart rate and labored breathing. Every animal at or just before death dribbled some blood-stained urine. The investigators also noted many blood vessels had ruptured, possibly through viral action. Those that had not ruptured appeared to be greatly enlarged, which could explain the shock witnessed just before death.

continued

Field reports on EHD indicate mule deer are more resistant to the disease and less likely to die after exposure. In one area with equal numbers of mule and white-tailed deer, approximately 20 times more white-tailed than mule deer succumbed;[5] in another study,[6] only 25% of infected mule deer died as compared with a 90% or greater mortality rate in experimentally infected white-tailed deer.

In a 1968-69 study conducted by the University of South Dakota,[7] investigators determined about 5% more mule deer were positive for EHD antibodies than white-tailed deer. Although 5% may not appear significant, it suggests a *possible* reservoir role of mule deer in the EHD virus-host transmission cycle. The study also revealed that a lower percentage (12%) of deer less than 1 year old contained antibodies, compared with 22% for adults. This suggests one of two mechanisms is at work: Young deer may not acquire the disease as readily until they are 1 year old or older; or possibly the most likely, many young deer afflicted with EHD die, so there are few animals available for blood testing. Testing of available blood sera in the latter case would expectedly yield a lower percentage of positive young deer.

The study showed little difference in disease incidence by sex—23% of the male deer tested positive for EHD antibodies, and 19% of the females tested positive.

During the late summer and fall of 1975, an outbreak of EHD resulted in death of an estimated 1,000 white-tailed deer in New Jersey.[8] Based on a sample size of 151 carcasses, researchers determined that 77% of the mortalities were adult deer. This figure may have been somewhat inflated since the remains of adults are more obvious and less scattered by scavengers.

In his study area along the Yellowstone River, Swenson found that more adults died from EHD than deer less than 1 year old. Although the sample size was small, he also determined the disease did not seem to affect a specific age group of males, but more 3½-year-old females were affected, with less incidence in younger and older females.

Many similarities exist between bluetongue (BT) and EHD: The viruses are similar in appearance as well as in biochemical and serological properties; clinical and pathological patterns mirror each other; they are both seasonal diseases beginning in mid-summer and usually ending abruptly with the first severe frosts, and both viruses are probably transmitted by injections of infectious blood and other virus-containing tissues. Like EHD, BT is most likely transmitted by a *Culicoides* vector. Because of these similarities, it is imperative to isolate and identify causative agents in any disease outbreak in deer populations.

Of equal importance is the question of how the BT virus is maintained from one BT season to the next. Some reservoir species is probably involved from which the insect obtains the virus before the beginning of each BT season. The fact that cattle can harbor the virus for variable periods, while showing little or no evidence of clinical infection, might be highly significant in the overall picture.

Typical symptoms include fever, depression and lack of appetite. The mucous membranes of the nasal cavity, mouth and tongue may become inflamed and ulcerous. The tongue may also swell and appear bluish.

Although BT probably was not involved in the epizootic in Montana, other studies have shown the virus produces mortality in white-tailed deer. In a cooperative study, animal disease researchers Daniel O. Trainer and M. M. Jochim[9] examined 1,012 blood sera samples from wild big game animals and evidence of BT was detected in elk, antelope, bighorn and Barbary sheep, moose and several species of deer.

Will EHD return? The answer to this question centers not on *will*, but rather *when*, and *to what extent*.

Because of the complexity of the disease, researchers need additional information:

- continued collection and examination of affected deer, including: (1) on-site post-mortem examinations and qualified interpretations on the frequency of clinical symptoms, (2) collection of fresh tissues and organs, i.e., blood, kidney, brain, etc. for virus isolation studies to determine whether EHD, BT, both or something else is involved and (3) assistance from landowners in notifying department personnel about sick and dying deer.
- a more complete picture of the virus transmission cycle and the role of specific vectors and reservoirs.
- a better understanding of environmental and climatic factors associated with the occurrence of hemorrhagic disease epizootics so researchers can recognize when conditions may signal an outbreak.
- improvement of techniques to quickly predict or recognize a serious outbreak. This would allow the department to respond with a cutback in either-sex whitetail permits in those areas most severely affected.
- modification of the department's reporting system for documenting EHD suspects, i.e., location, date, time, weather, behavior, etc.
- continued investigation of other factors as possible causative agents, including pesticide poisoning related to grasshopper control and ingestion of naturally occurring toxic plant species during EHD outbreaks.
- an information program to better inform the public about EHD and any deer management implications that may arise.

EHD raises several other questions, too. Sportsmen often ask if there is any danger from human contact or consumption of deer with EHD-like symptoms. An exhaustive review of the literature on this subject has shown no record of harmful effects from human contact or consumption of these deer. Dr. Frank Hayes of the Southeastern Cooperative Wildlife Disease Study at the University of Georgia has stated in a personal communication mentioned in "The 1975 Outbreak of Hemorrhagic Disease Among White-tailed Deer in Northwestern New Jersey" (see footnote 8 for the complete reference) that there was no public health significance associated with hemorrhagic disease outbreaks and that the disease could not be spread by transporting the carcass. Clifford Bampton, former chief of the North Carolina Division of Game, supported Hayes' view and further commented that outbreaks in North Carolina were related to areas with underharvested deer herds.[10]

What about controlling *Culicoides* (if they are the vector) through use of insecticides or wetland drainage? Such programs would be undesirable because of far-reaching effects on other wildlife. Second, even if these programs were realistically possible, costs would be staggering; the money could better be utilized in existing management programs.

Can deer be immunized against EHD through vaccines? To the best of this author's knowledge, a nonvirulent and highly protective vaccine strain has not been developed. Even if such a vaccine were available, it would not be feasible—or for that matter, practical—to launch a full-scale immunization program because of the obvious physical and monetary limitations. It is difficult enough to establish effective immunization programs among humans, and even more so in wild and wide-ranging white-tailed deer populations.

So what if we have EHD or BT in Montana? Epizootic deer diseases have undoubtedly existed in Montana for a long time and they will continue to recur. A knowledge of the major mortality factors influencing wildlife populations is essential to game management. Although much progress has been made in documenting and estimating the loss from annual legal harvest, and to a lesser degreee, highway mortality and illegal kill, the effects of disease in deer populations are normally insignificant and often go unnoticed. If game managers determine that epizootic outbreaks are associated with high whitetail densities, this may provide additional reason to maintain (through hunting) deer population levels at or below carrying capacity levels. This appears to be the most practical method of coping with epizootic outbreaks. ■

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# Feathers Underground– the burrowing owl

## by Frank Gjersing

## illustration by Takehiro Taira

THE GENTLY ROLLING PRAIRIE stretched before us like a dark gray sea. In the east, the approaching sunrise was gradually changing the early morning sky from delicate rose to varying shades of amber. We had been traveling in the cool morning for over an hour for a special treat—not only was it the opening day of grouse season, but my father was taking my brother and me to see our first prairie dog town.

As the yellow orb of the sun broke over the crest of the eastern hills, we gently slowed to a stop. For more than half a mile on either side of us, the ground was pockmarked with hundreds of holes, surrounded by small mounds of dirt. In quiet anticipation we began to inspect the town for "dogs." But because of a government poisoning program, most of the tunnels were covered with cobwebs—fine, gray lines which spelled death for the dogs. Although we saw no prairie dogs that day, an alarming "cack-cack-cack" introduced us to an equally interesting denizen of the prairie dog town—the burrowing owl.

This small brown owl, barred and spotted with buff and white on the back and barred with brown on its buffy underparts, is the only owl in the Western Hemisphere which is almost totally ground dwelling. With large wings adapted for silent flight, long legs and a stubby tail, it stands less than a foot tall. It is the only North American owl species in which the male is larger than the female. At home on the open prairies, its range extends from southern British Columbia and southern Manitoba south to central Mexico; it is also found in central Florida and the West Indies.

Of all the relationships which have developed between different species of animals, the one between the burrowing owl *(Speotyto cunicularia)* and burrowing mammals is certainly one of the most interesting. Although the burrowing owl can excavate its own burrow in the sandy soils of Florida, in the West it uses the burrows of other animals. The largest concentrations of these owls occur in prairie dog towns, although the owls use burrows of other animals such as ground squirrels, foxes and badgers. The burrow provides an area for nesting, shelter, protection from predators and possibly plays a role in regulating the owl's body temperature. Although these owls usually utilize vacant burrows, they occasionally take over occupied burrows and drive the tenant away by repeated "dive bombing."

When the owls arrive on the nesting ground in March and April, an ancient courtship ritual takes place. The male raises his feathers, displaying "white eyebrows" and chin markings to the female, while softly calling, "coo-coo." Both owls go through an intricate series of movements including scratching, nipping, leg and wing stretching and short flights.

Once the pair bond is formed, they select a burrow, secure it and do some interior decorating. Using their beaks, feet and wings, they enlarge the end of the burrow for the nest. They line the nest cavity, tunnel and entrance with dried cow or horse dung, weed stalks, grass, feathers or portions of prey. The female lays an average of seven to nine white eggs and the young hatch in about four weeks. When the young are about two weeks old, they emerge, stand at the burrow entrance and wait for the adults to bring them food.

Food habits of both adult and young owls are a little-known benefit to farmers and ranchers. Hunting and feeding both day and night, an adult consumes approximately 16% of its body weight daily, mostly in insects and small mammals. The appetite of the young can best be described as voracious. In one hour and 40 minutes, two adult owls observed by a Nevada biologist brought the following items to two nestlings: 22 grasshoppers, 17 beetles, two lizards, one frog and one jumping mouse.

A predator approaching a prairie dog colony which harbors burrowing owls is in for a surprise. One or all of three things may happen: (1) The male burrowing owl attempts to lure the predator away from the burrows by flying short distances and stopping; (2) one or both of the burrowing owl pair attack the predator from behind, or (3) the territoriality of the colony breaks down and the predator is "mobbed" by every owl within 300 yards that can fly. If this isn't enough and he continues to approach a burrow, the young birds hiding deep in the nest emit a rattling kind of hiss in almost perfect imitation of a rattlesnake.

Before the arrival of white man and his chemical eradication programs, burrowing owl populations were common on the numerous prairie dog towns scattered throughout the West. Since 1900, eradication of many of these towns has meant declining prairie dog populations. Once the burrowing mammals are gone, the owls' demise is inevitable. Studies in Oklahoma have shown that deterioration of burrows after poisoning a prairie dog town made them useless to owls within one year. In areas where small prairie dog populations persisted after poisoning, burrowing owls utilized only burrows in the active areas of the dog town.

In the evening, the little owls sitting on the mound of dirt in front of their burrows remind one of an elderly couple enjoying the sunset and contemplating the good times of a swiftly passing era. Unless man checks this little owl's habitat destruction—due primarily to widespread mammal control activities—we may someday see the "sunset" of this species and the passing of a unique era in the annals of the West. ■

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Fires, Rain and Grouse Seasons
see page 2